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CHEMISTRY

No. 104

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CONTENTS

ADSORPTION

Low Temperature Adsorption Removal of Methane From Argon
(N. Ye. Kosyakov, et al.; ZHURNAL PRIKLADNOY KHIMII, Mar 83)..... 1

AEROSOLS

Catalytic Filtration of Aerosols
(A. G. Amelin, et al.; KOLLOIDNYY ZHURNAL, Mar-Apr 83)..... 2

ANALYTICAL CHEMISTRY

Influence of n-Butylbenzoate on Propylene Polymerization Kinetics in δ-$TiCl_3$-$AlEt_2Cl$ and δ-$TiCl_3$-$AlEt_2Cl$-$MgPh_2$ Catalytic Systems
(Ye. I. Voronova, et al.; IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK, Mar-Apr 83)..... 3

Increased Sensitivity and Selectivity in Opticoacoustic Multiphoton Spectroscopy
(L. N. Vereshchagina, et al.; VESTNIK MOSKOVSKOGO UNIVERSITETA SERIYA, 2: KHIMIYA, Mar-Apr 83)..... 3

CATALYSIS

Telomerization of Isoprene With Piperidine on Complex Palladium Catalysts
(L. I. Zakharkin, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 5

New Catalysts of Reduction of Aromatic Diazocompounds by Alcohols to Hydrocarbons
(V. S. Lenenko, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 5

Quaternary Ammonium Salt-Catalyzed Alkylation of Organic Element-H Acids
(A. T. Babayan, G. G. Gekchyan; ARMYANSKIY KHIMICHESKIY ZHURNAL, Mar 83)..... 6

CHEMICAL INDUSTRY

New Process for Utilization of Low Concentration Sulfurous Gases in Metallurgy
(N. G. Vilesov; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 7

Antiadhesive Coverings for Duraluminum Extrusion Molds Used in Production of Complex Components Made of Composition Materials
(L. F. Makiyenko, et al.; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 7

Use of TsL Type Mixers in Production of Fire Extinguishing Powders
(E. I. Davydov, et al.; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 8

Standardization Device for Nuclear Magnetometer
(A. A. Gordiyenko; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83).. 8

Production of Hydrogen Fluoride From Potassium Hexafluorosilicate
(I. F. Mulyarchuk, G. V. Panchenko; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 9

COAL GASIFICATION

Current Status and Potential of Liquid Fuel Production
(K. Ye. Makhorin; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)... 10

Comparative High Temperature Gasification of Coal With Different Stages of Metamorphism
(Ya. S. Zholudov, L. Ya. Afanasenko; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 10

ELECTROCHEMISTRY

Electrochemistry of Semiconductors: New Problems and Prospects
(Yu. Ya. Gurevich, Yu. V. Pleskov; USPEKHI KHIMII, Apr 83)..... 12

FERTILIZERS

Reserves of Industrial Productivity
(A. Petelya; NARODNOYE KHOZYAYSTVO KAZAKHSTANA, Sep 82).... 13

Production Possibilities of Complex Liquid Fertilizers From Non-Ferrous Metallurgy Byproducts
(N. F. Vovkotrub, et al.; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 20

Central Asian Salt Industry Problems
(R. G. Osichkina; UZBEKSKIY KHIMICHESKIY ZHURNAL, Jan-Feb 83)..... 20

Physical-Chemical Principles of Production of Fertilizer Containing Trace Elements and Physiologically Active Substances
(S. Tukhtayev; UZBEKSKIY KHIMICHESKIY ZHURNAL, Jan-Feb 83). 21

Liquid Complex Fertilizers SUM-V-Zh and Their Use in Uzbekistan Agriculture
(A. V. Kiselev; UZBEKSKIY KHIMICHESKIY ZHURNAL, Jan-Feb 83)..... 21

Production of Double Superphosphate Based on Karatau Phosphorites by Continuous Process
(M. R. Adylova, et al.; UZBEKSKIY KHIMICHESKIY ZHURNAL, Jan-Feb 83)..... 22

Development of Production Process for Granulated Ammophos From Concentrated Acid Pulp
(A. V. Kononov, et al.; KHIMICHESKAYA PROMYSHLENNOST', Apr 83)..... 22

FOOD TECHNOLOGY

Contribution of Problems Laboratory of Moscow Technological Institute of Meat and Milk Industry to Implementation of Food Program Tasks
(V. Ye. Gul'; PLASTICHESKIYE MASSY, Apr 83)..... 23

Increasing Social-Economic Effectiveness of Polymer Materials in Meat and Milk Industry
(T. Ye. Sergiyenko, et al.; PLASTICHESKIYE MASSY, Apr 83).. 24

INORGANIC COMPOUNDS

Synthesis and Effects of Certain Oxides on Properties of $Pb(Zr,Ti)O_3$ Ferroelectric Ceramics
(M. Ye. Levina, et al.; VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA, Mar-Apr 83)..... 25

Effluent From Vacuum-Carbonate Sulfur Purification Departments of Coke Chemical Plants--Effective Anticaking Reagent for Potassium Fertilizers
(A. P. Yanovskaya, et al.; KHIMICHESKAYA PROMYSHLENNOST', Apr 83)..... 25

ORGANOMETALLIC COMPOUNDS

Synthesis of Silicon, Germanium and Tin Carbodiimides by Interacting Their Organohalides With Calcium Cyanamide in Hexamethylphosphorotriamide
(I. A. Vostokov; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 27

ORGANOPHOSPHORUS COMPOUNDS

Steric Structure of Phosphorus-Containing Heterocycles, Report 31: 2-Dialkylamino-1,3,2-Dioxaphosphorinanes With 4-Coordination Phorphorus
(B. A. Arbuzov, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 28

Structure of Certain Galactite Amidothionophosphorylation Products
(L. I. Gurariy, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 29

Interaction of 1,3,2-Oxazaphospholanes With Trivalent Phosphorous Acid Chlorides
(M. A. Pudovik, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 29

Reactivity of 1,3,2-Diheterophospholanes Containing Three Coordination Phosphorus Atom
(M. A. Pudovik, et al.; USPEKHI KHIMII, Apr 83)..... 30

Interaction of Trivalent Phosphorus Thioacid Amides With Carboxylic Acid Anhydrides and Halides
(O. G. Sinyashin, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)... 30

Phosphorylated Benzimidazoles, Part 7: Synthesis of Phosphorylated ^{32}P Benzimidazoles
(A. M. Makarov, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 31

Interaction of Imidophosphenous Acid Amides With Phenylisocyanate: Molecular Structure of 1-Phenyl-3-Tert-Butyl-2-Bis(Trimethylsilyl)Amino-1,3,2λ^3-Diazaphosphetidine-4-One
(L. N. Markovskiy, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 32

New Method of Synthesis of Tertiary Phosphine Oxides Containing 1,4-Azaphosphorine Ring
(L. S. Moskalevskaya; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 32

Reaction of Phosphites With 1,2,2,2-Tetrachloroethylisocyanate
(N. K. Mikhaylyuchenko, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 33

β-Iodoethylphosphonic Acid Derivatives
(L. G. Anan'yeva, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)... 33

Electron Donor and Acceptor Functions of Physiologically Active and Model Compounds. Report 3. Electron Donor Function of Phosphoryl Oxygen in Several Organophosphorus Compounds
(O. A. Rayevskiy, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)... 34

Kinetics of Imination of Triphenylphosphine by 4-Azidotetrachloropyridine
(L. F. Kasukhin, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 34

Interaction of Monosubstituted Diethylphosphorous Acid Amides With Sulfur Chlorides
(S. K. Tupchiyenko, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).. 35

Synthesis of 4-Phosphorylated Oxazoles and Thiazoles
(V. S. Brovarets, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).... 35

Reamidation of Phosphorous Acid Hexaalkyltriamides by Primary Aromatic Amines
(Yu. G. Trishin, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 36

Triamidophosphazochlorides
(A. P. Marchenko, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).... 36

Reaction of S-Ethyldiphenylthiophosphinite With Benzaldehyde
(V. A. Al'fonsov, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).... 37

Synthesis of Trifluoroacyloxydithia- and Oxazaphospholanes
(I. V. Konovalova, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)... 37

Nucleophilic Reamidation in Aminoiminophosphines
(V. D. Romanenko, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).... 37

Phosphorylation of Alkylpyrroles by Chlorophosphites
(P. A. Gurevich, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 38

Unsaturated Organophosphorus Compounds Based on 1-Vinylbenzotriazole
(V. G. Rozinov, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 38

Diamidofluorophosphazohydrocarbons
(A. P. Marchenko, et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83).... 39

Synthesis of Glycidyl Esters of 2(3)-Dialkylphosphonoalkanols
(A. K. Brel', et al.; ZHURNAL OBSHCHEY KHIMII, Mar 83)..... 39

Interaction of Tributylphosphine With Isopropenylacetylene
(G. Ts. Gasparyan, et al.; ARMYANSKIY KHIMICHESKIY ZHURNAL, Mar 83)..... 40

PESTICIDES

Hydrolysis of Dichlorophos
(A. V. Grechko, et al.; KHIMIYA I TEKHNOLOGIYA VODY, Mar-Apr 83)..... 41

PETROLEUM PROCESSING TECHNOLOGY

Catalytic Pyrolysis of Direct Distillation of Gasoline Over Activated Vanadium Catalyst
(S. P. Chernykh, et al.; KHIMICHESKAYA PROMYSHLENNOST', Apr 83)..... 42

POLYMERS AND POLYMERIZATION

Thermally Stable Polymers Based on Alicyclic Dianhydrides
(B. A. Zhubanov, et al.; PLASTICHESKIYE MASSY, Apr 83)..... 43

Causes of Anomalously Low Adhesion of Polymer Coatings to Copper
(N. I. Tishkov; KOLLOIDNYY ZHURNAL, Mar-Apr 83)..... 43

Experimental Study of Mass Transfer of Certain Model and Medicinal Substances Through Microporous Polymer Membranes in Aqueous Solutions
(M. M. Fel'dshteyn, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, Apr 83)..... 44

Role of Charged Particles and Relaxation Phenomena in Mechanical Fracture of Polymer Dielectrics in Strong Electric Field
(M. A. Kurbanov, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, Apr 83)..... 44

Durability and Deformation Behavior of Polybutadiene in Uniaxial Extension in Liquids
(M. K. Kurbanaliyev, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, Apr 83)..... 45

Mechanism of Increasing Impact Strength of Plastics by Raw Rubber Dispersions
(G. M. Lukovkin, et al.; VYSOKOMOLEKULYARNYYE SOYEDINENIYA, Apr 83)..... 46

Use of Computers in Studies of Polymer Thermal Destruction Processes Based on Thermogravimetric Analysis Method
(S. D. Petrenko, Yu. A. Mikhaylov; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 46

Influence of Bombardment With Accelerated Electrons on Physical-Chemical Properties of Polyester Coatings
(D. I. Grigorchuk, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, Apr 83)..... 47

Synthesis of Phosphorus-Containing Polyurethane Semicarbazides and Their Properties
(A. P. Grekov, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, Apr 83)..... 48

New Initiator for Acrylamide Polymerization in Aqueous Solutions
(R. M. Akopyan, et al.; ARMYANSKIY KHIMICHESKIY ZHURNAL, Mar 83)..... 48

Effects of Certain Aminoalcohols on Methylmethacrylate Photopolymerization Kinetics
(B. M. Sogomonyan, et al.; ARMYANSKIY KHIMICHESKIY ZHURNAL, Mar 83)..... 49

RUBBER AND ELASTOMERS

Efficiency Criteria for Resin-Fiber Compositions Exposed to Dynamic Loads
(A. V. Kuz'min, et al.; KHIMICHESKAYA TEKHNOLOGIYA, Mar-Apr 83)..... 50

Hydrophobicity of Butadiene, Butadiene-Styrene and Butadiene-Nitrile Rubber Films on Silicate Glass
(Yu. I. Skorik, S. A. Kuchayeva; ZHURNAL PRIKLADNOY KHIMII, Mar 83)..... 50

Physical Mechanical Properties of Salt Vulcanisates Obtained From Aqueous Dispersions of Carboxylated Butadiene-Nitrile Rubbers
(N. S. Gusakova, et al.; KAUCHUK I REZINA, Apr 83)..... 51

Vulcanization of Chloroprene Rubber With Polyethylenimine
(A. P. Boguslavskiy, et al.; KAUCHUK I REZINA, Apr 83)..... 51

WATER TREATMENT

Removal of Phenol From Waste Water on Ionites
(V. M. Zverev, et al.; ZHURNAL PRIKLADNOY KHIMII, Mar 83).... 53

Potentiometric Quality Control of Water Disinfection in Ship Water Supply Systems
(Yu. V. Vodzinskiy, et al.; KHIMIYA I TEKHNOLOGIYA VODY, Mar-Apr 83)..... 53

Quality Control of Drinking Water by Automatic Station 'Nayada'
(I. A. Ar'yev, et al.; KHIMIYA I TEKHNOLOGIYA VODY, Mar-Apr 83)..... 54

MISCELLANEOUS

Influence of Polyelectrolytes on Electric Surface Properties of Microorganisms
(V. M. Fomchenkov, et al.; KOLLOIDNYY ZHURNAL, Mar-Apr 83)... 55

Use of Silverless Materials for Electron Beam Information Recording
(N. P. Kupreychik, et al.; IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK, Mar-Apr 83)..... 55

Structured Transforms and Conductivity of Titanium-Containing Glasses During Heat Treatment
(V. V. Tavgen', et al.; IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK, Mar-Apr 83)..... 56

Chemical Conversions in Compounds Containing a Nitrile Group Upon Deformation in Compressed State
(N. P. Chistotina, et al.; IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA, Apr 83)..... 57

X-Ray Study of Process of Formation of Titanium Coatings on Diamond
(V. G. Chuprina, et al.; UKRAINSKIY KHIMICHESKIY ZHURNAL, Apr 83)..... 57

Solubility of Solid Argon in Gaseous Helium
(L. S. Kushner, et al.; ZHURNAL FIZICHESKOY KHIMII, Apr 83)..... 58

Interaction of Graphite Compounds of Empirical Composition $C_2F \cdot 0.12BrF_3$ and $C_2F_{1.12}$ With Elementary Fluorine
(A. M. Danilenko, et al.; ZHURNAL NEORGANICHESKOY KHIMII, Apr 83)..... 58

Organic Photoresists With Dry Method of Application and Development (Vacuum Photoresists)
(Ye. I. Balabanov, et al.; ZHURNAL PRIKLADNOY KHIMII, Mar 83)..... 59

ADSORPTION

UDC: 541.183

LOW TEMPERATURE ADSORPTION REMOVAL OF METHANE FROM ARGON

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 56, No 3, Mar 83
(manuscript received 22 May 81) pp 690-691

KOSYAKOV, N. Ye., IVCHENKO, B. I. and KRISHTOPA, P. P.

[Abstract] Results are presented from studies of the purification of argon to remove methane by an adsorption method at low temperatures. The greatest methane capacity at temperatures from -60 to 160°C was that of NaX zeolite adsorbent. Experimental data obtained in subsequent studies of adsorption of methane from argon as a function of temperature and pressure performed using NaX zeolite agree well with calculated results produced using the Freundlich equations, indicating a linear variation of methane adsorption from argon as a function of temperature and pressure. Figure 1.
[247-6508]

UDC: 541.182.21.3.628.511.4

CATALYTIC FILTRATION OF AEROSOLS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 83
(manuscript received 11 Sep 81) pp 287-288

AMELIN, A. G., KABANOV, A. N., MASLENNIKOV, B. M. and TOMISHKO, M. M., Chemical Technology Institute imeni D. M. Mendeleyev, Moscow; Scientific Research Institute for Fertilizer and Insectofungicides, Moscow

[Abstract] Experiments were performed to determine the nature of forces changing the movement of aerosol particles at the surface of a catalyst as a reaction mixture containing solid suspended particles moves through a granular layer of catalyst when conditions are set up for occurrence of a catalytic reaction. Powdered calcium oxide was introduced to the air flow passing through the experimental installation at an average concentration of 0.32 g/m^3. The carrier gas was SO_2. It was found that increasing the active component in the catalyst to 30 mass % sharply increases the aerodynamic resistance of the filtering catalyst layer and increases effectiveness of dust trapping. Figures 3; references: 3 Russian.
[243-6508]

ANALYTICAL CHEMISTRY

UDC: 541.64

INFLUENCE OF n-BUTYLBENZOATE ON PROPYLENE POLYMERIZATION KINETICS IN δ-$TiCl_3$-$AlEt_2Cl$ AND δ-$TiCl_3$-$AlEt_2Cl$-$MgPh_2$ CATALYTIC SYSTEMS

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 2, Mar-Apr 83 (manuscript received 9 Nov 82) pp 11-15

VORONOVA, Ye. I., YEROFEYEV, B. V. and VALENDO, A. Ya., Institute of Physical and Organic Chemistry, Belorussian SSR Academy of Sciences

[Abstract] A kinetic study was undertaken in two catalytic systems in the presence of n-butylbenzoate as an electron donor. One of the basic purposes of the study was to compare the kinetics of polymerization with and without n-butylbenzoate. Propylene was polymerized in a manometric installation allowing the kinetics of the process to be traced based on the rate of absorption of gas from a calibrated container. As the concentration of the ester increases the activity of the catalytic system first increases to a molar ester/Ti ratio of 0.05, then begins to decrease. This occurs at both 50 and 70°C. The results are similar to those obtained by Burfield and Tait with amines, indicating that the action of electron donor additives is rather common for various types of electron donors. Figures 3; references 15: 4 Russian, 11 Western.
[249-6508]

UDC 621.378.9

INCREASED SENSITIVITY AND SELECTIVITY IN OPTICOACOUSTIC MULTIPHOTON SPECTROSCOPY

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA SERIYA, 2: KHIMIYA in Russian Vol 24, No 2, Mar-Apr 83 (manuscript received 22 Feb 82) pp 145-148

VERESHCHAGINA, L. N., ZHAROV, V. P., OSMANOV, R. R., PUTILIN, F. N. and SHTEPA, V. I., Chair of Physical Chemistry

[Abstract] Studies were conducted on increasing the sensitivity and selectivity of opticoacoustic (OA) spectroscopy by taking advantage of the fact that in the case of multiatomic molecules with more than three atoms the OA signal shows a steady rise as laser beam intensity is increased, whereas with simple molecules a saturation effect is obtained beyond which the OA signal does not

show a further increase. Experiments with pure CO_2 and a small admixture of propylene (C_3H_6) and a CO_2 laser (pulse energies up to 3 J, 100 nsec pulses) demonstrated a saturation effect with the pure CO_2 system. Addition of a small amount of C_3H_6 (0.2 mm Hg C_3H_6 + 99.8 mm Hg CO_2) resulted in a further rise in the OA signal at intensities of 10^2 J/cm^2 due to multiphoton adsorption by C_3H_6. In comparison with lower energy levels this respresents an eight- to ten-fold increase in the sensitivity of C_3H_6 detection. The increased sensitivity and selectivity obtained with multiphoton absorption may be used in the detection of air pollutants (C_2H_4, freons, ammonia, etc.) in the presence of background absorption due to H_2O and CO_2. Figures 3; references 5: 3 Russian, 2 Western.
[260-12172]

UDC: 542.97:66.095.2:547.315.2:547.822.3

TELOMERIZATION OF ISOPRENE WITH PIPERIDINE ON COMPLEX PALLADIUM CATALYSTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 11 May 82) pp 886-890

ZAKHARKIN, L. I., PETRUSHKINA, Ye. A. and PODVISOTSKAYA, L. S., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] A study was made of the telomerization of isoprene with piperidine as a means of synthesizing N-(dimethyloctyl)-piperidines, which include active plant growth regulators. Catalytic systems included $PdCl_2$+Ph_3P(A), $(Ph_3P)_2$-$PdCl_2$(B), $Pd(OAc)_2$+2Ph_3P(C), $Pd(acac)_2$+2Ph_3P(D), $Pd(OAc)_2$+2$P(OC_6H_4CH_3$-o$)_3$(E) in a solution of MeOh, EtOH, i-PrOH, t-BuOH and $Pd(acac)_2$+4$(BuO)_3P$(F) and $Pd(OAc)_2$+4$(BuO)_3P$(H) in a solution of MeCN. Telomerization in $PdCl_2$+Ph_3P, $(Ph_3P)_2PdCl_2$, $Pd(OAc)_2$+2Ph_3P, $Pd(acac)_2$+2Ph_3P and $Pd(OAc)_2$+2$P(OC_6H_4CH_3$-o$)_3$ in methanol occurs with little regioselectivity to form a mixture of isomeric N-(dimet yloctadienyl)piperidines. Telomerization in catalytic systems $PdCl_2$+Ph_3P and $Pd(OAc)_2$+2Ph_3P in methanol forms four basic telomers: N-(2,6-dimethyloctadiene-2, 7-yl)-, N-(3,7-dimethyloctadiene-2,7-yl)-, N-(3,6-dimethyloctadiene-2,7-yl)- and N-(2,7-dimethyloctadiene-2,7-yl)diethylamines. Telomerization from catalytic systems $Pd(acac)_2$ or $Pd(OAc)_2$+4$(BuO)_3P$ in acetonitrile forms three basic telomers: N-(2,6-dimethyloctadiene-2,7-yl)-, N-(3,7-dimethyloctadiene-2,7-yl)-, and N-(2,7-dimethyloctadiene-2,7-yl)piperidines. References 12: 3 Russian, 9 Western.
[252-6508]

UDC: 541.128:542.941:547.556.7

NEW CATALYSTS OF REDUCTION OF AROMATIC DIAZOCOMPOUNDS BY ALCOHOLS TO HYDROCARBONS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 30 Jul 82) pp 947-950

LENENKO, V. S., BORISOV, A. P., MAKHAYEV, V. D., MYSOV, Ye. I., SHUR, V. B. and VOL'PIN, M. Ye., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Information is presented on the catalytic activity of various nitrogen, carbonyl and hydride complexes of Mo and W in the reduction of

aromatic diazocompounds by alcohols to the corresponding hydrocarbons. Various nitrogen, carbonyl and hydride complexes of Mo and W are capable of catalyzing the reduction of aromatic diazocompounds to hydrocarbons. The effectiveness of the reaction depends on the nature of the initial metal complex, diazocompound and other factors. With proper selection of the catalyst the selectivity of the reaction is quite high and the yield of ArH hydrocarbon is near quantitative. References: 6 Russian.
[252-6508]

UDC 541.128.1+66.095.25+661.528

QUATERNARY AMMONIUM SALT-CATALYZED ALKYLATION OF ORGANIC ELEMENT-H ACIDS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL In Russian Vol 23, No 3, Mar 83 (manuscript received 15 Dec 82) pp 150-167

BABAYAN, A. T. and GEKCHYAN, G.G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] A review is provided of the role of quaternary ammonium salts in the catalysis of organic element-H acid alkylation by alkyl halides. Investigation of a large number of reactions has shown that the presence of a quaternary ammonium salt increases the yield of the alkylated product to 60-80% in the case of alkylation of aniline, o-toluidine, o-, m-, and p-anisidines, p-phenetidine, α- and β-naphthylamines, acetanilide, phenacetin, etc. In the absence of the salts the yield is usually on the order of 20-37%. Investigations of the mechanism of action have shown that the quaternary ammonium salts largely influence the ratio of the C- and O- alkylated products by strongly favoring the production of the latter. References 48: 42 Russian, 6 Western.
[261-12172]

UDC 669.004.8

NEW PROCESS FOR UTILIZATION OF LOW CONCENTRATION SULFUROUS GASES IN METALLURGY

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 18 Nov 82) pp 10-12

VILESOV, N. G, Institute of Gas Research, UkSSR Academy of Sciences

[Abstract] Considerable quantities of sulfurous gases, currently produced as byproducts of metallurgical industry, require development of novel methods for their purification and possible use as recycled materials. Such a method based on the ammonia process was developed and tested on a pilot plant scale. Starting with relatively low concentrations of sulfurous gases (0.3-1.5%), this process allowed purification of the exhaust gases down to 0.03-0.01%, yielding 85% of elemental sulfur and 15% of calcium sulfate. The process can be summarized as follows: the exhaust gases are passed through a scrubber with 1% aqueous ammonium sulfate. The saturated solution eluted from the scrubber is mixed with lime and passed on to a reactor where it is stirred at 55-65°C and reduced with H_2S. The sulfur formed is collected by flotation and the residual liquid is converted to ammonium sulfate and recirculated. The process is economical and advantageous from the point of view of atmospheric pollution. Figure 1; references: 5 Russian.
[239-7813]

UDC 667.64:621.7:073

ANTIADHESIVE COVERINGS FOR DURALUMINUM EXTRUSION MOLDS USED IN PRODUCTION OF COMPLEX COMPONENTS MADE OF COMPOSITION MATERIALS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2,, Mar-Apr 83 pp 30-32

MAKIYENKO, L. F., MALITSKAYA, I. G., OS'MAKOV, O. G., KHOBOTOV, V. M. and YUR'YEV, S. V.

[Abstract] Results are reported on experimental selection of antiadhesive covers for Duraluminum extrusion molds designed for production of complex forms from compositions based on epoxy-phenol binders. The following agents were tested: lubricant K-21, rubber SKT, liquid 136-41, fluorolon 32L and fluorolon 32L with a 25% addition of fluorolon 4NTD. All of these agents were capable of forming thermally stable antiadhesive films on the surfaces of

extrusion molds. The results showed that the best material was the lubricant K-21 which assured the highest number of non-defective product removals. It was also discovered that cleaning the extrusion molds with an aqueous solution of phenol improved the antiadhesive properties of K-21, by increasing the product removal three-fold without any defects. References: 6 Russian.
[239-7813]

UDC 621.929.6:614.842.611

USE OF TsL TYPE MIXERS IN PRODUCTION OF FIRE EXTINGUISHING POWDERS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83 pp 47-49

DAVYDOV, E. I., KOSHKOVSKIY, S. S., KOSHCHEYEV, G. G., MAZEPA, A. M. and TULINA, L. V.

[Abstract] Vertical belt mixers are used in production of fire extinguishing powders P-IA and P-2AP. They are not satisfactory in terms of adequate mix, productivity and overall effectiveness. Several experimental models were evaluated: centrifugal-blade mixer (TsL-12), auger (PZh-63) and disaggregational-blade mixer (DL-40). The TsL mixer was selected as the optimal instrument for preparation of P-IA and P-2AP powders, yielding a homogeneous mass with excellent performance characteristics. During these studies the caking property of P-IA and P-2AP was found to be related to their hydrophobic characteristics, which in turn was related to the content of aerosil. It was determined to be economically advantageous to substitute silicon-organic liquid for the aerosil. Figures 3.
[239-7813]

UDC 621.317.44(0.88,8)

STANDARDIZATION DEVICE FOR NUCLEAR MAGNETOMETER

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83 pp 58-60

GORDIYENKO, A. A.

[Abstract] A special standardization device was developed, capable of converting the frequency of electromagnetic vibrations, at which nuclear magnetic resonance (NMR) is observed, to a new succession of impulses in which the number of impulses per second equalled the intensity of the magnetic field. The magnetic fields were determined with sensitive proton, lithium and deuterium detectors. Their standardizing coefficients were 4258, 6536 and 1655 respectively. Depending on the detector, the corresponding division coefficient was determined. At the moment of NMR, information about the intensity of the magnetic field appeared on the screen in Tesla units. Figures 2.
[239-7813]

UDC 661.487

PRODUCTION OF HYDROGEN FLUORIDE FROM POTASSIUM HEXAFLUOROSILICATE

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83 pp 15-17

MULYARCHUK, I. F. and PANCHENKO, G. V.

[Abstract] In the present work, the production of hydrogen fluoride from apatite concentrate during its nitric acid treatment was achieved through alkaline decomposition of potassium hexafluorosilicate yielding potassium and ammonium fluorides and difluorides. Precipitation of potassium hexafluorosilicate was performed with potassium carbonate or with NPK fertilizers during apatite decomposition at 30°C. HF was then obtained by thermal or H_2SO_4 decomposition of potassium fluoride or difluoride. References 12: 9 Russian, 3 Western.
[239-7813]

UDC 662.75(-87)

CURRENT STATUS AND POTENTIAL OF LIQUID FUEL PRODUCTION

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 6 Dec 82) pp 3-7

MAKHORIN, K. Ye., Institute of Gas Research, UkSSR Academy of Sciences

[Abstract] An analysis of fuel needs and resources for the last two decades of the 20th century is reported. It appears that oil price has reached its top level and from now the cost may drop due to discovery of new deposits outside the Middle East and decreased consumption of the largest user--the United States. Due to increased cost of oil, gasification and synfuel production became attractive, especially based on shale oil. Reserves of this crude along with brown coal should be sufficient for practically the next century. In the USSR there is an excess of oil production and huge reserves of coal and natural gas. Unfortunately, like in other countries, these reserves are in the poorly inhabited territory, where consumption is very low and transportation very poor. The western republics (Ukraine) where the need for fuel is high, have a deficit production of oil. Overall, it is predicted that for the foreseeable future synfuel will supplement oil deficits. New energy sources will be considered, including nuclear energy. Figures 2; references 13: 12 Russian (4 by Western authors), 1 Western.
[239-7813]

UDC 662.747

COMPARATIVE HIGH TEMPERATURE GASIFICATION OF COAL WITH DIFFERENT STAGES OF METAMORPHISM

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83 pp 7-10

ZHOLUDOV, Ya. S. and AFANASENKO, L. Ya.

[Abstract] Chemical-physical processes occurring during oxidative gasification of coal were studied. The process was intensified by dispersing the solid phase and by increasing the temperature of the gasifying agent. The reaction products obtained from the reactor were cooled and separated. Experiments were performed on three types of coal: Donetsk anthracite (ASh), Ekibastuzk coal with high ash content (EU) and Kansk-Achinsk brown coal (KA). The reaction was evaluated by the composition of gaseous and solid phases of the

starting material and the end products. The process occurred to a considerable extent already at about 2000 K and at 2400 K the concentration of end products increased considerably (ASh = 35%, EU = 42% and KA = 53%). This was obviously related to the reactivity of coal. The gasification process depended on the stoichiometric relationship of the reagents. Analysis of the end products showed that 56% of organic mass of EU reacted in this process, while KA material reacted at 94% level. Figures 2; references 5: 4 Russian (2 by Western authors), 1 Western.
[239-7813]

UDC: 541.13:621.315.592

ELECTROCHEMISTRY OF SEMICONDUCTORS: NEW PROBLEMS AND PROSPECTS

Moscow USPEKHI KHIMII in Russian Vol 52, No 4, Apr 83 pp 563-595

GUREVICH, Yu. Ya. and PLESKOV, Yu. V., Institute of Electrochemistry, USSR Academy of Sciences, Moscow

[Abstract] A resurgence of interest in semiconductor electrochemistry began in the 1970's and still continues due to the discovery of the possibility of using semiconductor electrodes to convert solar energy by photoelectrolysis of water, producing hydrogen. This literature survey discusses characteristic energy levels in an electrode-electrolyte solution system, specifics of the structure of the division boundary in such a system, and presents a quasi-thermodynamic approach to the description of photoelectrochemical processes. Some new practical applications of semiconductor electrodes are noted, including photoelectrochemical conversion of solar energy, laser etching of semiconductors, and ion selective field-effect transistors. It is noted that semiconductors with multilayer crystalline lattices are particularly promising for practical applications. New research methods involving primarily the effects of light on interphase boundaries are briefly discussed. Figures 16; references 90: 25 Russian, 65 Western.
[253-6508]

FERTILIZERS

RESERVES OF INDUSTRIAL PRODUCTIVITY

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 9, Sep 82 pp 31-34

[Interview with Tleubay Mukanovich Al'zhanov, chief of the All-Union Production Association "Soyuzfosfor" by A. Petelya, internal correspondent for NARODNOYE KHOZYAYSTVO KAZAKHSTANA, date and place not specified]

[Text] The Food Program, developed in conjunction with resolutions of the 26th session of the CPSU and sanctioned by the May 1982) Plenum of the CPSU Central Committee, is putting concrete problems before each branch of the national economy, entering into the united agricultural-industrial complex of the country. The chemical industry takes an important position. Intensification of agricultural production, to a large degree, depends on its level of development.

In Kazakhstan, at the base of the richest deposits of phosphorite in Karatau, large enterprises operate, specializing in the production of phosphate fertilizer and mineral feed additives. Use of their products in agriculture permits a significant increase in productivity of the fields, beneficially affecting the output of animal husbandry farms. Meanwhile, the demand for the granules of fertility are far from fully satisfied. What is restraining the growth in production of phosphate fertilizers? What measures are suggested in order to wipe out this deficit? To these and other questions, the Chief of the All-Union Production Association "Soyuzfosfor", T. Al'zhanov, responded to our internal correspondent A. Petelya.

[Question] Tleubay Mukanovich, chemization of agriculture is considered a generally-accepted factor for a speedy and effective solution to the Food Program. In this context, we would like to know, what role does the phosphorous industry play, and what is its present condition?

[Answer] The main direction of chemization of agricultural production is the large-scale use of mineral fertilizers. By 1985, it is planned to provide rural delivery of mineral fertilizers in the amount of 26.5 million tons, and by 1990, 30-32 million tons (in conversion to 100-percent nutrient substances), and of chemical feed additives, 950,000 tons and 1.2 million tons, respectively.

The phosphorus industry makes, and must make, a sizeable contribution to this matter. I notice that this is one of the youngest and most vigorously developing sub-branches of the system of the USSR Ministry of Mineral Fertilizer Production. Let's say, for the last decade and a half, the production of phosphorus, the initial product for obtaining fertilizers, was increased more than 40 times, while Karatau phosphorite, in the balance of demand of phosphate raw material, occupied second place. By the end of the current five-year plan, production of phosphorite in the "Karatau" union is planned to increase by more than a factor of 1.5, while production of fertilizers in the "Soyuzfosfor" processing enterprises will increase by a factor of 2.

Such a rapid pace of growth is due to the fact, primarily, that today a definite disproportion in the ratio of nitrogen and phosphorus fertilizers used is seen. Agrochemical scientists state, that the ratio of nutritive substances in these fertilizers (nitrogen and phosphorus) equals 10:6, while the optimal is 10:9.

Of course, the planned program for building up production of phosphorus is calculated on the basis of the achieved level of development for the sub-branch, and the powerful potential of its enterprises. Over the last 15 years, basic funds grew tenfold, and technical equipment fivefold. In the past five-year plan alone new capacities in stone quarrying production in the "Karatau" Association were introduced, large-scale sulfuric acid production at the Dzhambulskiy superphosphate factory were created, and the first line of the Novodzhambulskiy phosphorus factory was constructed, where, now, a sintering complex for manufacturing raw materials and an increased unit-power phosphorus furnaces are being mastered.

Nevertheless, the phosphorus industry, as before, remains greatly indebted to the state. During steadfast growth in the basic funds, its efficiency did not increase, but even decreased. By far, not all enterprises have coped with the tasks in output of yellow phosphorus and mineral fertilizers. All of our troubles started with the fact that our production powers were mastered very slowly. Let us say, such giants of heavy chemistry as the Dzhambulskoye and Chimkentskoye production associations "Khimprom" and "Fosfor", operating for more than 15 years, have not yet yielded design capacity. Use of capacity, on the whole, in sub-branches at the beginning of the current five-year plan comprised 56% in output of yellow phosphorus, and 51% of mineral fertilizers.

[Question] New, more complex and important problems, posed by the Food Program to the phosphorus industry, it is thought, will be easier to solve, knowing the concrete causes of the permitted delay and breaks in work...

[Answer] The causes were known long ago. All our efforts have been directed toward their removal. The first, and most important of these causes is design errors and incomplete work, permitted during a sufficiently high pace of construction of phosphorus plants. Here must be attributed the fact that heavy chemical enterprises were supplied, principally, with new equipment. Whereupon, they were placed into operation without experimental tests or full running-in of pilot samples. In haste, additional measures had to be settled for, in order to eliminate designer and constructor flaws, to rearm and modernize production lines, taking into account the latest achievements of science and practice.

The second cause is covered in the complexity of structure of Karatau phosphorite. It is a result of poor investigation of their "behavior" in their further electrothermal processing. During the intensive development of mining operations, production of the growing volumes began to involve new varieties of phosphorites, the natural properties of which required changes in existing methods of preparing the raw material.

[Question] It is well known that the problem of preparing raw material has not been completely solved, and judging by statements of specialists and the press (including NARODNOYE KHOZYAYSTVO KAZAKHSTANA), there is not yet a clear technical policy in the methods of its solution...

[Answer] Actually, in a number of press organs, the main direction of our technical policy in the area of raw material preparation was placed in doubt, as insufficiently tested and validated. But, I say with all determination, the time for discussion is past.

The scientific-technical search for new methods of preparing raw material led us to the introduction of sintering phosphorite at the Novodzhambulskiy plant. The first line of the sintering complex here has been operating since 1980. It's true, due to designer errors, this progressive equipment still does not yield full output. What is more, for obtaining sturdy sinter, the need for finer crushing of the ore developed. In connection with this, the "Gosgorkhimproekt" institute was charged to develop the design of a special crushing department. Nonetheless, these positive results, which were obtained in the course of mastering the phosphorus furnaces, unique in their single-unit power, operating on sinter, are a credit to the new direction in raw material preparation. All the same, for other phosphorus plants, phosphorite sintering technology was acknowledged economically unsuitable. Considerable expenditures, connected with mastering the sintering complex, led, naturally, to increases in product cost. And also, it's simply impossible to construct a large-scale sintering complex in crowded areas of operating factories, and transport of the sinter (in the case where it is manufactured in a centralized factory) lowers the yield of suitable, prepared raw material because of its crushing during transshipment and prolonged storage.

Scientists suggested a new alternative--production of high-strength pellets. This method of preparing raw material is widely used in domestic ferrous metallurgy and in the majority of phosphorus plants abroad. The Ministry of Mineral Fertilizer Production already made a decision on creation, in the current five-year plan, of a factory for production of calcined pellets. It will be built in the city of Karatau. In it, installation of modern, highly-efficient OK-520 roasting machines is specified. USSR Mintyazhmash is charged with producing them.

Certainly, the decision on construction of the pellet factory was made not without verifying the suitability for industrial production and economy of their redesigning. Last year, industrial testing of new technology was conducted in the "Kuybyshevfosfor" Association. For example, the quality of pellets with sinter and lumps of phosphorite, having undergone thermal preparation by the traditional system, were compared. The preference for pellets

is obvious; a high economy for their processing in phosphorus furnaces was achieved. Nevertheless, considering the newness of the new technology, "Soyuzfosfor" specialists, together with scientists, developed a long-term coordination program, the goal of which is to define the calcining mode more accurately for the various ores of the Karatau basin, to determine the effect of these or other lithologic differences on the durability of pellets, and also to conduct classification of the various types of ores suitable for producing pellets and sinter.

Introduction of enrichment of phosphorites in heavy suspensions is another important direction in the technical policy for the Karatau basin. This principally new technology permits fuller use of reserves of the "rock of productivity" avoidance of random production at a number of deposits, and neutralization of the harmfulness which hinders normal operation of phosphorus plants. Now, the development of the enriching mode for various ores at a pilot commercial plant is going at full speed. In it, testing of phosphorite from the T'esaj mine has already been done. The results are positive. In the near future, it will be necessary to complete all experimental works on suspension enrichment. This will speed adoption of the technology of suspension enrichment of the factory, the decision on construction of which was recently made.

[Question] From what you said earlier, it follows that the phosphorus industry in recent years has been elevated to a new level of technical progress. What role have scientific organizations played in this?

[Answer] Naturally, in selecting the direction of technical policy for subbranches, in perfecting technology and equipment, conducting various research, scientists provide us with invaluable help. In the last five-year plan, for example, 11 branches of institutes, many academic and scientific institutes of the country, including 5 institutes of the Kazakh SSR Academy of Sciences and 7 of Kazminvuz, worked on solving problems of the phosphorus industry. In a word, one can't complain about the inattention of scientists. In turn, we cover the expenditure connected with conducting scientific research and experimental work. In the last five-year plan, from all sources, their financing comprised over 40 million rubles.

What have scientists done? I will name the most important developments which have already been introduced, or are today being introduced, into production. These are enrichment of phosphorites in heavy suspension; preparation of raw materials for electrothermics by the sintering method; obtaining "PK" type fertilizers from Cottrell dust and lean slurry; processing rich phosphorus slurry in modernized cyclones; drying coke in shaft furnaces with sloping grates, etc.

However, we are very disquieted by the fact that the output which science gives to production is extremely low. Judge for yourself: the effectiveness from realizing scientific-technical developments, introduced into sub-branches in the last five-year plan, was, by far, not more than half the expenditure--26 million rubles. The causes for such a situation are many. And one of them is covered in the isolation of branches of science from production. Let us say, that such large institutes as "LenNIIgiprokhim" and GIGKhS, located thousands

of kilometers from the Karatau-Dzhambulskiy territorial-production complex must carry out the lion's share of scientific work for the large chemical enterprises. Unfortunately, we have no leverage for control over the activities of these institutes, since they are within the jurisdiction of the "Soyuzgorkhimprom" and "Soyuzosnovkhim" all-union industrial unions.

We hope that the Administration for Science and Technology of USSR Minudobreniy will find an acceptable form of double subordination of GIGKhS and "LenNIIgiprokhim", and also for all branches of scientific organizations to introduce an order of payment for stages of work according to results of their accomplishment.

Measures have been planned for improving the activity of the coordinating committee on the problems of extraction, enriching, and processing Karatau phosphorites, created by the ministry. We still have not eliminated the fact of dispersion of scientific forces and means to less important, nonurgent topics, repeating one or another work in several scientific organizations. For example, 11 institutes are engaged in the topic of processing phosphorite slurry. Each of them propose their own means, vaguely substantiating its preference, then put together proceedings and...place them on the archive shelf. But the problem of processing slurry both has been, and remains, unsolved. Business contract topics are not always critically evaluated with institutions of higher learning. The "Karatau" Association let us say, concluded an agreement with scientific institutes for conducting scientific research in the current five-year plan for 1.6 million rubles. And not one kopek is specified for the product of this research!

Among the combined difficulties on solving scientific-technical problems, we attach great significance to increasing the level of scientific developments in our young branch institute "KazNIIgiprofosfor", located in Chimkent. Opportunely, in Alma-Ata, two important subdivisions of this institute were created and are operating--the department for complex design of mining items for the "Karatau" company, and the laboratory for automation of technological processes. Namely, they are assigned to plan the future of developments in the phosphorus industry in Kazakhstan. Meanwhile, both of these subdivisions do not have a proper material foundation. We, unfortunately, over a long period of time, have not been successful even in obtaining permission for them to complete construction on the production building.

[Question] Tleubay Mukanovich, what is still retarding development of this branch? How do you see the reserves for more fully providing farming with phosphorus fertilizers and other chemical products?

[Answer] In the 11th Five-Year Plan, the specific amount of capital investments, directed to the reconstruction and technical reequipping of operating large-scale chemical enterprises, has grown. However, this does not mean that the construction program has become less intensive. In a very compressed time, in the Karatau basin, we must introduce new power into the extraction of phosphorites, enriching the raw material, into production and into calcining pellets. In factories, it is necessary to construct additional works and process stages, in the chemical cities--housing residences. However, republic assembly and

construction organizations of Minmontazhspetsstroy and Mintyazhstroy are slowly widening the front of works of items for the phosphorus industry, but those ministries are responsible for strengthening the construction base. I quote one fact. The amount of uncompleted construction recently exceeded 1.4 times the annual amount of capital investments. The especially difficult situation was made up with the introduction in the Karatau-Dzhambulskiy territorial-production complex of items of social-domestic significance. Chemists in the tenth five-year plan were deficient more than 100,000 m^2 living space, kindergartens, secondary occupational schools and prophylactic dispensaries. How, under these conditions, can factories be staffed with a work force?

Not long ago, in the CPSU Central Committee, a conference took place where problems of speeded construction and placing industrial enterprises into operation in production of mineral fertilizers were examined in the light of the requirement resulting from the 26th session of the Party and the May (1982) Plenum of the CPSU CC. Here, the necessity for sequential accomplishment of the instructions of the General Secretary of the CPSU CC, L. I. Brezhnev. These instructions were, that it is necessary for maximum attention to be paid--by party, soviet and economic organs, by the workers unions, and the Komsomol--to timely placing into service the installations of the agroindustrial complex (including those of the chemical industry) as the shock buildings of the nation.

We hope that Mintyazhstroy and Minmontazhspetsstroy of the republic, are understandably concerned with the situation that has grown more complex in our subbranch and will take proper measures for the most rapid start-up of all object sites, providing an increase in production of mineral fertilizers.

Now, let us dwell on our internal reserves. At the 4th All-Union conference of phosphorus industry workers, which took place in April of last year in Karatau, the state of affairs in the subbranch was critically analyzed. Here, in particular, it was noted that great possibilities for increase in the output of products in our plants were covered in improvement in operation of equipment, increase in quality of repairs, and strengthening labor and technology discipline. Underestimation of these factors are manifested especially graphically in the "Khimprom" and "Fosfor" production companies, and in the Novodzhambulskiy phosphorus plant. Due to unsatisfactory maintenance of the electrothermal furnaces, infractions of technological modes and of labor discipline accidents and extended time waste of apparatus occur. In order to strengthen discipline, to improve operations and repair the equipment, it was decided to increase requirements for engineering cadres and, primarily, mid-level management, to raise the level of their organizational work in the collective shops, shifts, and sectors (of the plant).

We see, in stiffening the regimen for economy in all types of resources, an important reserve for raising effectiveness of production. Unfortunately, today, almost all large chemical enterprises tolerate overexpenditure of coke, electric power, metal, ammonia, sulfuric acid, and other materials. To raise a tough shield against mismanagement, special commissions, created in the factories were formed.

In the 11th Five-Year Plan, a 1.5-fold increase in labor productivity of phosphorus workers was planned. The possibility for its growth was covered in automation and complex mechanization of production processes, introduction of advanced methods and forms of organization of labor.

As the main result and reserve of further growth of the sub-branch, we consider that, in the comparatively short term of its existence (a little more than 15 years), experienced labor collectives have been formed in the enterprises of chemistry, highly-qualified cadres of workers and specialists have grown, and a pleiad of young scientists have been trained. It is precisely in this that our confidence is founded that the phosphorus sub-branch will complete the responsible tasks laid down by the 26th session of the party and May (1982) Plenum of the CPSU CC for the production of mineral fertilizers. Phosphorus workers are doing everything in their power for the successful realization of the Food Program. Today they are compared to the leading collectives of the "Kuybyshevfosfor" and "Karatau" production associations, which steadfastly accomplish state plans and socialist obligations.

12304
CSO: 1841/218

UDC 669.004.8:631.8

PRODUCTION POSSIBILITIES OF COMPLEX LIQUID FERTILIZERS FROM NON-FERROUS METALLURGY BYPRODUCTS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 11 Oct 82) pp 12-13

VOVKOTRUB, N. F., BOGOMAZ, T. I., SHCHEGROV, L. N. and KOPILEVICH, V. A.,
Ukrainian Agricultural Academy

[Abstract] Slag obtained from smelting brass was used as the starting material for complex liquid fertilizers (CLF). Highly dispersed powdery slag was mixed with ortho- and polyphosphoric acid at room temperature, changing the acid:slag ratio from 99:1 to 90:10. The reagents were heated at room temperature and up to 100°C in 20° increments for 2-24 hrs with periodic stirring. It was shown that the extraction rate of zinc and copper was inversely related to the solid mass content. Orthophosphoric acid extracted more Zn and Cu than the polyphosphoric acid in all experimental variations. Overall, by regulating the duration of the reaction and its temperature, up to 40% of Zn and Cu could be extracted from the slag. Phosphoric acids enriched with these elements could be used as CLF's. References: 4 Russian.
[239-7813]

UDC: 533.632.06(575)

CENTRAL ASIAN SALT INDUSTRY PROBLEMS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 83
(manuscript received 17 Nov 82) pp 10-18

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[Abstract] A summary is presented of the potassium fertilizer situation in Central Asia. Many tons of this fertilizer are transported each year from the European portion of the USSR over long distances for use on cotton fields in Central Asia. It is thus desirable to open salt deposits in Central Asia for the purpose of potassium fertilizer manufacture. An analysis is presented of the material composition of a number of salt deposits in order to determine the physical and chemical conditions under which they were formed. The data indicate that intensive secondary conversion of the rock has occurred, manifested as

dissolution of salts and secondary crystallization in the diagenetic stage of formation of the deposits and the formation of silvenite by incongruent decomposition of carnalite. It is concluded that potassium fertilizer plants could be colocated in Karakalpakia with the large deposits of sulfate salts to provide chloride-free potassium-containing fertilizers for Central Asia. References: 14 Russian.
[240-6508]

UDC: 541.123.31.62+546

PHYSICAL-CHEMICAL PRINCIPLES OF PRODUCTION OF FERTILIZER CONTAININC TRACE ELEMENTS AND PHYSIOLOGICALLY ACTIVE SUBSTANCES

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 83 (manuscript received 18 Nov 82) pp 26-34

TUKHTAYEV, S., Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] A study is made of the development of scientific principles and production of combined fertilizers containing trace elements and physiologically active substances. It is most promising, agrochemically and economically desirable to use trace elements and physiologically active substances together with basic mineral fertilizers. A technology has been suggested for the production of urea containing trace elements. The interaction of sulfates of copper, zinc and cobalt with phosphoric acid and monocalcium phosphate has been studied to develop a process for producing double superphosphate with trace elements. Three basic technologies for this prooess are described. All three are found effective. Figures 4; references: 23 Russian.
[240-6508]

UDC: 633.511:631.8

LIQUID COMPLEX FERTILIZERS SUM-V-Zh AND THEIR USE IN UZBEKISTAN AGRICULTURE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 83 (manuscript received 17 Nov 82) pp 47-51

KISELEV, A. V., Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] SUM-V-Zh, produced by the classical method of nitric acid treatment of phosphates, is the world's least expensive complex liquid fertilizer. The author's laboratory, in cooperation with other institutes, has proven that the nitrogen and phosphorus of liquid complex fertilizers are equilivalent to the nitrogen and phosphorus of ordinary solid fertilizers such as ammonium nitrate in agronomic and agrochemical effectiveness. Years of field testing with various crops, including cotton and vegetables, have proven this liquid fertilizer to be effective and over 20% less expensive than traditional solid fertilizers. It is best used in the southern dark chestnut soil zone of the USSR in carbonaceous soils. References: 4 Russian.
[240-6508]

UDC: 632.855

PRODUCTION OF DOUBLE SUPERPHOSPHATE BASED ON KARATAU PHOSPHORITES BY CONTINUOUS PROCESS

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 1, Jan-Feb 83 (manuscript received 29 Apr 82) pp 77-82

ADYLOVA, M. R., NAMAZOV, Sh. S., AKHMADZHANOVA, R., ABDURAKHMANOVA, R., Institute of Chemistry, Uzbek SSR Academy of Sciences

[Abstract] A study was made of the influence of temperature, ratio of initial components (acid and phosphate), time of interaction, addition of nitrate salts and drying of the product on the degree of decomposition of phosphate raw material by phosphoric acid. Experiments were performed in a thermostated reactor with a blade stirrer at 80 and 100°C with an acid concentration of 41.4% as P_2O_5. The experimental data indicated that with an increasing acid content the degree of decomposition of phosphorite increases. Addition of ammonium nitrate together with phosphorite to extraction phosphoric acid at the beginning of the process results in an increase in the degree of decomposition of the raw material. The production of double superphosphate from Karatau phosphoric acid and Karatau phosphorite by a continuous flow method is demonstrated to be possible. Drying of the double superphosphate slurry at up to 220°C increases the degree of decomposition of the phosphate raw material, the concentration of water soluble P_2O_5 and eliminates water from the dehydrated fertilizer without retrogradation of the assimilable phosphorus. Figures 2; references: 12 Russian.
[240-6508]

UDC 631.859.13

DEVELOPMENT OF PRODUCTION PROCESS FOR GRANULATED AMMOPHOS FROM CONCENTRATED ACID PULP

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 83 pp 219-221

KONONOV, A. V., BRODSKIY, A. A., KLENITSKIY, A. I., BELOZEROV, L. P., CHELEBI, G. A., TRUTNEVA, N. V., MEL'NIKOV, Ye. B. and MIKHAYLOV, V. V.

[Abstract] Earlier it was shown that acid pulps of ammonium phosphates could be used in the production process of granulated ammophos. The process consisted of neutralization of extracted phosphoric acid, evaporation of acid pulp to 6-10% content of moisture, ammonization and granulation. Three methods were developed for ammonization of pulp and granulation of ammophos: pulverization of concentrated phosphate pulp onto the layer of the product, addition of the pulp on top of the pseudoliquefied material and addition of the pulp directly into the layer of pseudoliquefied material. In all three cases, average diameter of the granulated product ranged from 1.5 to 2.5 mm. Figures 2.
[258-7813]

UDC: 678.5.004.14:667.777

CONTRIBUTION OF PROBLEMS LABORATORY OF MOSCOW TECHNOLOGICAL INSTITUTE OF MEAT AND MILK INDUSTRY TO IMPLEMENTATION OF FOOD PROGRAM TASKS

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 83 pp 5-7

GUL', V. Ye.

[Abstract] The use of polymer packaging materials and coatings in the food industry will assist in the implementation of the food program as defined by the 26th CPSU Congress. Calculations performed in the problems laboratory of the Moscow Technological Institute of the Meat and Milk Industry indicate that the use of polymer packaging materials will allow a savings of 257,000 tons of meat and milk products, 95,000 tons of fish and fish products, 800,000 tons of bread, flour, sugar and vegetable oil and 2.6 million tons of vegetable products and seed potatoes by 1985. This quantity of food is sufficient to fulfill the needs of millions of persons and achieve a savings of 1.9 billion rubles. The use of polymer films in agriculture provides a mean profit of 4,300 rubles per ton of film while simultaneously sharply increasing the productivity of plants. The use of polymers not only greatly reduces the loss of food products but also has a significant social effect. Increased productivity means that fewer workers can perform more work without significant capital investment. Scientific research has resulted in the production of biologically harmless polymers for use in contact with food and have allowed formulation of scientifically well-founded criteria for evaluating the quality of multicomponent coatings for food products based on polyvinyl alcohol, cellulose esters, protein film-forming products and aqueous dispersions of vinyl and vinyladine chloride copolymers, elastomers and thermoelastic and thermoplastic materials. Applied scientific research based on these results has included the development of basically new cryotechnology for the conversion of polymers from solutions combining modification of polymer properties and production of coatings in a single operation. A technology has been introduced for producing food grade latex and aqueous butyl rubber dispersions. Since 1981 the problems laboratory of the Moscow Technological Institute of the Meat and Milk Industry has been studying the influence of the chemical structure of polymers on the gas, vapor and aromatic permeability of membranes. Studies are to continue into 1985, though effective membranes have already been produced for the storage of fruits and vegetables, lengthening the storage life by 2 to 3 months and reducing losses by a factor of 4 to 5.
[241-6508]

UDC: 678.5.003.13:667.777

INCREASING SOCIAL-ECONOMIC EFFECTIVENESS OF POLYMER MATERIALS IN MEAT AND MILK INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 83 pp 45-48

SERGIYENKO, T. Ye., SACHKOVA, L. A., GENEL', S. V. and GUL', V. Ye.

[Abstract] The meat and milk industry is among the largest consumers of polymer materials. The use of cellophane, polyethylene and other films in the meat and milk industry is surveyed by this report in broad strokes. The replacement of glass containers with plastic containers is expected to yield significant money savings while improving the quality of food products. The use of antiadhesion coatings on equipment and storage containers yields good social and economic effects. The use of antiadhesion polymer coatings in the production of meat products could decrease labor requirements by 400 persons and save over 3 million rubles. Use of polymer packaging materials and coatings in the meat and milk industry will help to solve a number of social and economic problems such as the elimination of heavy manual labor, significant reduction in the loss of food products in all stages, from production through consumption, and more complete satisfaction of the demands of the population for food.
[241-6508]

UDC 537.226.33

SYNTHESIS AND EFFECTS OF CERTAIN OXIDES ON PROPERTIES OF $Pb(Zr,Ti)O_3$ FERROELECTRIC CERAMICS

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 2: KHIMIYA in Russian Vol 24, No 2, Mar-Apr 83 (manuscript received 15 Mar 82) pp 162-166

LEVINA, M. Ye., SHARDANOVA, M. B., GULISH, O. K. and SOKOLOVSKAYA, Ye. M., Chair of General Chemistry

[Abstract] Cryoprecipitation technology was employed in the preparation of solid composites with the empirical formula $Pb_{1-x}Me_x(Zr_{0.53}Ti_{0.47})O_3$, where Me = Y, Gd, or Nd, and x = 0.025, 0.050, 0.075, or 0.100 mole%. The technique involved freezing finely dispersed salt droplets of an aqueous solution of the salts present in stoichiometric proportions, subsequent mixing with aqueous ammonia for precipitation of the mixed hydroxides, and two calcinations at temperatures 300-350°C below those commonly employed in solid phase synthesis of ferroelectric ceramics. Particle size in the ferroelectric ceramics prepared by the cryoprecipitation method was much smaller than obtained by the solid phase method and ranged from 0.83 to 1.4 microns, indicating good caking capacity. Study of the dielectric properties over the temperature range of 20 to 600°C revealed a linear dependence of the temperature of phase transition on the ionization potential of the added components. Figures 3; references 3: 1 Russian, 2 Western.
[260-12172]

UDC 546.32.131:66.02.34

EFFLUENT FROM VACUUM-CARBONATE SULFUR PURIFICATION DEPARTMENTS OF COKE CHEMICAL PLANTS--EFFECTIVE ANTICAKING REAGENT FOR POTASSIUM FERTILIZERS

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 83 pp 214-216

YANOVSKAYA, A. P., KARPITSKAYA, L. N., MOZHEYKO, F. F. and ALEKSANDROVICH, Kh.A.

[Abstract] Diminished caking of potassium fertilizers is normally achieved by treating them with aliphatic amines, which are expensive and toxic compounds. One highly effective agent which could replace aliphatic amines is the effluent from the vacuum-carbonate sulfur purification departments of coke chemical plants. In the present paper experimental results were reported of a

study of this effluent as an additive to KCl. The effluent, a concentrated solution of several salts, has had no practical use until now. It was shown that this effluent is an effective anticaking agent, better than octadecylamine. Its effectiveness is evidently due to the content of both mineral salts and hydrophobic organic admixtures. The effluent, just like the octadecylamine, had no effect on the hygroscopic properties of KCl; the two additives markedly affect solubility of KCl. Figures 4; references 16: 10 Russian, 6 Western.
[258-7813]

ORGANOMETALLIC COMPOUNDS

UDC: 547.(245+246+258)

SYNTHESIS OF SILICON, GERMANIUM AND TIN CARBODIIMIDES BY INTERACTING THEIR ORGANOHALIDES WITH CALCIUM CYANAMIDE IN HEXAMETHYLPHOSPHOROTRIAMIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 15 Jun 82) pp 577-581

VOSTOKOV, I. A., State Scientific Research and Planning Institute of the Nitrogen Industry and of Products of Organic Synthesis, Dzerzhinsk Branch

[Abstract] Direct synthesis of carbodiimides of silicon, germanium and tin is performed by the interaction of calcium cyanamide with the corresponding organohalides in HMPTA. The identity of the carbodiimides with previously known compounds was confirmed by comparing their physical constants and IR spectra. Complexes of HMPTA with CaX_2 were preliminarily studied on the example of calcium chloride. When chlorides of silicon and tin were studied complexes were isolated corresponding to $CaCl_2 \cdot 3HMPTA$ and $CaCl_2 \cdot 2HMPTA$. When polyhalogen alkyl and aryl derivatives of elements of the silicon subgroup are introduced to the reaction mixtures the corresponding carbodiimides are formed.
References 14: 11 Russian, 3 Western.
[248-6508]

UDC 541.63:547.1'118

STERIC STRUCTURE OF PHOSPHORUS-CONTAINING HETEROCYCLES, REPORT 31: 2-DIALKYLAMINO-1,3,2-DIOXAPHOSPHORINANES WITH 4-COORDINATION PHOSPHORUS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 6 Jul 82) pp 796-803

ARBUZOV, B. A., ARSHINOVA, R. P., NABIULLIN, V. N., IL'YASOV, A. V., GUBAYDULLIN, R. N. and SOROKINA, T. D., Chemical Institute imeni A. M. Butlerov; Kazan State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The steric characteristics of the compounds studied in this series of articles is established by an approach based on determining the electrical parameters of P bonds using the dipole moments of rigidly mounted stereo isomers of alkylated dioxaphosphorinanes, with subsequent use of the parameters found to analyze conformationally mobile systems. PMR spectra of some of the compounds are presented. The chair conformation with axial thiophosphoryl group is preferable for 2-dialkylamino-2-thiono-1,3,2-dioxaphosphorinanes. Cis-2-diethylamino-2-thiono-4-methyl-1,3,2-dioxaphosphorinane has a similar structure with equatorial orientation of 4-methyl. The trans-isomer exists as a three-component equilibrium of two chair conformations and a flexible form. The energy difference between the two chair conformations drops to 0.67 kcal/mol in 5-spirooxetan derivatives. An increase was found in the longitudinal component of anisotropy of polarizability in the P=S bond in 2-dialkylamino-2-thiono-1,3,2-dioxaphosphorinanes in comparison to the corresponding thiophosphates. Figures 6; references 10: 7 Russian, 3 Western.
[252-6508]

UDC: 541.6:542.91:547.1'118

STRUCTURE OF CERTAIN GALACTITE AMIDOTHIONOPHOSPHORYLATION PRODUCTS

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 30 Jun 82) pp 896-903

GURARIY, L. I., LITVINOV, I. A., STRUCHKOV, Yu. T., YUFIT, D. S., ARBUZOV, B. A. and MUKMENEV, E. T., Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] Continuing studies in the area of phosphorylation of configuration isomer hexites and pentenes of compounds of three coordination phosphorus, the authors studied the interaction of galactite with tris(N-diethylamido)-phosphite. It was found that with a molar ratio of the reagents of 1:3 and reaction time in pyridine at 95-100°C not over 4 hours, the yield of 1,2,4; 3,5,6-bis-O-(phosphite) galactite is about 35%. The yield decreases almost to half if the reaction is conducted in dioxane and its length increased to 20 hours. Also produced in the reaction are diastereomer 1,6-bis-O-[di-(N-diethylamido)thionophosphate)-2; 3; 4,5-bis-O-N-diethylamidothionophosphate] galactities. References 8: 5 Russian, 3 Western.
[252-6508]

UDC 542.91:547.1'118

INTERACTION OF 1,3,2-OXAZAPHOSPHOLANES WITH TRIVALENT PHOSPHOROUS ACID CHLORIDES

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 6 Jul 82) pp 903-907

PUDOVIK, M. A., OSTANINA, I. L., and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] The interaction of 2-alkoxy-3-methyl-(phenyl)-1,3,2-oxazaphospholanes with pyrocatechin chlorophosphite results in an exchange of exocyclic substituents and the formation of 2-ethoxy-4-5-benzo-1,3,2-dioxaphospholane and 2-chloro-1,3,2-oxazaphospholanes. A study of the reaction by ^{31}P NMR showed that the first stage is breaking of the endocyclic P-N bond and formation of N, O-diphosphorylated methylaminoethanol which upon heating and distillation breaks down to 1,3,2-diheterophospholanes, the reaction products. References 11: 10 Russian, 1 Western.
[252-6508]

UDC: 547.341

REACTIVITY OF 1,3,2-DIHETEROPHOSPHOLANES CONTAINING THREE COORDINATION PHOSPHORUS ATOM

Moscow USPEKHI KHIMII in Russian Vol 52, No 4, Apr 83 pp 640-668

PUDOVIK, M. A., OVCHINNIKOV, V. V., CHERKASOV, R. A. and PUDOVIK, A. N., Kazan State University imeni V. I. Ul'yanov-Lenin; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] New and interesting material has been accumulated concerning the reaction mechanism of 1,3,2-diheterophospholanes and phosphorinanes based on the concept of the structure of intermediates or transitional states with increasing coordination number of the phosphorus atom. This review of the Soviet and western literature discusses the basicity of these compounds and their complex formation mechanisms, reactions with compounds containing mobile hydrogen atoms, biphilar reactions, Arbuzov regrouping reactions with carbonyl compounds, substitution at the phosphorus atom upon exposure to reagents not containing a mobile hydrogen atom, expansion of the ring and polymerization. Many purely synthetic aspects of the chemistry of these compounds are not discussed in this review. Particular attention is given to the compounds with five membered rings The materials presented in the review indicate that the reactivity of 1,3,2-diheterophospholanes is unique in nature. The geometry of these molecules causes changes in the hybridization of the unshared electron pair of the phosphorus atom and less nucleophilicity of the phosphorus atom than in acyclic P(III) derivatives. The great variety of chemical conversions characteristic of P(III) organic compounds is supplemented by reactions involving growth of the ring, recyclization and spiro-cyclization. The comparative instability of unsubstituted five membered phosphacyclanes containing tne P(III) atom supports processes of oligomerization, making these cyclic organophosphorus compounds similar to bifunctional monomers. References 245: 119 Russian,126 Western.
[253-6508]

UDC: 547.26'118

INTERACTION OF TRIVALENT PHOSPHORUS THIOACID AMIDES WITH CARBOXYLIC ACID ANHYDRIDES AND HALIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 31 May 82) pp 502-505

SINYASHIN, O. G., KOSTIN, V. P., BATYYEVA, E. S. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] A study was made of the reaction of S,S-dialkyl-N-diethylamidodithiophosphites (I) with carboxylic acid halides. The interaction of (I) dithioamidophosphites with acetyl chloride and bromide as well as benzoyl chloride at 20°C showed that, regardless of the halogen atom and substituent at

the carbonyl group carbon, the reaction always involves substitution of the amide group at the halogen atom with formation of dithiophosphorous acid halides and the corresponding carboxylic acid diethylamide. Arbuzov reaction products were not formed in any case. Considering this, the authors studied the reaction of S, S-dialkylamidodithiophosphites with halogen acyls at -40° to +20°C using ^{31}P NMR spectroscopy. The reaction products in all cases were dithiophosphorous acid halides, with no α-ketophosphonates noted. The direction of the reaction therefore is independent of halogen atom, substituent at the carbonyl group carbon and temperature. References 12: 10 Russian, 2 Western.
[248-6508]

UDC: 547.26'118

PHOSPHORYLATED BENZIMIDAZOLES, PART 7: SYNTHESIS OF PHOSPHORYLATED ^{32}P BENZIMIDAZOLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 13 May 82) pp 505-510

MAKAROV, A. M., MATEVOSYAN, G. L. and ZAVLIN, P. M., Leningrad Agricultural Institute

[Abstract] ^{32}P-labeled mono-, di- and tri(1-benzimidazolido)phosphates were obtained in a nuclear chemical reaction: $^{35}Cl(n,\alpha)\rightarrow^{32}P$. Hot phosphorus-32 atoms with energy 50,000 eV were obtained on a Po-Be neutron source using CCl_4. The quantity of the end product produced under these experimental conditions is not over 10^{-12} mmol. The studies performed have yielded a method for synthesis and identification of ^{32}P-labeled phosphorylated benzimidazoles with a specific activity close to the maximum possible activity allowing determination of permissible residual quantities of these preparations in food products and the maximum quantity of growth regulators in various objects in the environment. Figures 2; references:10 Russian.
[248-6508]

UDC: 546.18+541.63+543.422.8

INTERACTION OF IMIDOPHOSPHENOUS ACID AMIDES WITH PHENYLISOCYANATE: MOLECULAR STRUCTURE OF 1-PHENYL-3-TERT-BUTYL-2-BIS(TRIMETHYLSILYL)AMINO-1,3,2λ^3-DIAZAPHOSPHETIDINE-4-ONE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 14 Jul 82) pp 525-540

MARKOVSKIY, L. N., ROMANENKO, V. D., RUBAN, A. V., IKSANOVA, S. V., CHERNEGA, A. N., BOLDESKUL, I. Ye., ANTIPIN, M. Yu., YESPENBETOV, A. A. and STRUCHKOV, Yu. T., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev; Institute of Heteroorganic Compounds imeni A. N. Nesmeyanov, USSR Academy of Sciences, Moscow

[Abstract] Results are presented from studies of the reaction of phenylisocyanate with N, N-bis(trimethylsilyl)-N'-tert-butylamidoimidophosphenite (IB), 2,2,6,6-tetramethylpiperidine of N'-trimethylsilylimidophosphenous acid (IC) and N,N'-bis(tert-butyl)-N-trimethylsilylamidoimidophosphenite (ID). The interaction of (IB, IC and ID) with phenylisocyanate was performed under conditions close to those previously described for the synthesis of phosphenite (reagent ratio 1:1, temperature 40-55°C, no solvent). It was found that depending on the nature of the substituent R' imidophosphenous acid amides R'N=P-N($SiMe_3$)R (where R = Me_3Si or Me_3C) react with phenylisocyanate without involving the two coordinated phosphorus atom to form functionally substituted λ^3-phosphazenes or by [2+2]-cycloattachment to form 1,3,2λ^3-diazaphosphetidine-4-ones. The spatial structure of 1,3,2λ^3-diazaphosphetidine-4-ones is established on the basis of spectral and x-ray structural studies. Figures 5; references 40: 10 Russian, 30 Western.
[248-6508]

UDC: 547.241

NEW METHOD OF SYNTHESIS OF TERTIARY PHOSPHINE OXIDES CONTAINING 1,4-AZAPHOSPHORINE RING

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 21 Jul 82) pp 545-548

MOSKALEVSKAYA, L. S., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] An attempt was made ot produce phosphinic acid and phosphonium salts containing the 1,4-azaphosphorine ring by the action of ammonia on tetrakis (β-chlorostyryl) phosphonium chloride. The attempts were unsuccessful. Interaction of the product of this reaction with concentrated sulfuric acid and subsequent hydrolysis of the reaction mixture forms 2,6-diphenyl-4-phenacyl-1,4-azaphosphorine with partial splitting of one C-P bond to form 2,6-diphenyl-4-oxy-4-oxo-1,4-azaphosphorine. The methine atoms in both 1,4-azaphosphorines

are quite mobile and under mild conditions are substituted by bromine atoms when exposed to elemental bromine. 2,6-Diphenyl-4-oxo-4-phenylacetylenyl-1,4-azaphosphorine is resistant to the action of alkalis, forms unstable salts with hydrogen chloride, is not acylated by CH_3COCl in benzene. When exposed to sulfuric acid, then water, it is hydrolyzed at the acetylene group. References 6: 3 Russian, 3 Western.
[248-6508]

UDC: 547.26'118+547.494

REACTION OF PHOSPHITES WITH 1,2,2,2-TETRACHLOROETHYLISOCYANATE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 5 Jul 82) pp 548-554

MIKHAYLYUCHENKO, N. K., KOZHUSHKO, B. N. and SHOKOL, V. A., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] It was found in previous works that chloro-, dichloro- and trichloromethylisocyanates easily enter into an Arbuzov reaction with alkyl esters of trivalent phosphorus acids to form the corresponding mono-, di- and triphosphorylated methylisocyanates. The present work studied the extension of this reaction to other α-chloroalkylisocyanates. When 1,2,2,2-tetrachloroethylisocyanate interacts with diethylchlorophosphite, 1-(ethoxychlorophosphonyl)-2,2,2-trichloroethylisocyanate (I) is formed. However, both during the reaction and during vacuum distillation hydrogen chloride splits from isocyanate (I) producing a mixture of isocyanate (I) and unsaturated 1-(ethoxychlorophosphonyl)-2,2-dichlorovinylisocyanate (II). When dialkyl halogen- and trialkylphosphites are interacted with 1,2,2,2-tetrachloroethylisocyanate, 1-phosphorylated-2,2,2-trichloroethylisocyanates are formed which are then converted to 1-phosphorylated-2,2-dichlorovinylisocyanates. References 5: 4 Russian, 1 Western.
[248-6508]

UDC: 547.241

β-IODOETHYLPHOSPHONIC ACID DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 24 Jul 82) pp 554-559

ANAN'YEVA, L. G., FEDOROVA, G. K. and BOLDESKUL, I. Ye.

[Abstract] It was found that when thionyl chloride interacts with β-iodoethylphosphonic acid in a ratio of 1:2 in benzene at 20-25°C, no reaction seems to occur, while when the temperature is increased to 75-80°C hydrogen chloride is liberated and a colorless solid amorphous substance containing no chlorine is formed which is demonstrated to be β-iodoethylphosphonic acid anhydride (II).

Alcohols and aniline form the corresponding monoalkyl esters and anilide of β-iodoethylphosphonic acid. β-Iodoethylphosphonic acid with triphenylphosphine yields β(triphenylphosphonium)ethylphosphonic acid iodide. References 3: 2 Russian, 1 Western.
[248-6508]

UDC: 543.422:547.1'118

ELECTRON DONOR AND ACCEPTOR FUNCTIONS OF PHYSIOLOGICALLY ACTIVE AND MODEL COMPOUNDS. REPORT 3. ELECTRON DONOR FUNCTION OF PHOSPHORYL OXYGEN IN SEVERAL ORGANOPHOSPHORUS COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 27 Nov 81) pp 563-567

RAYEVSKIY, O. A., GILYAZOV, M. M. and LEVIN, Ya. A., Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka; Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan Branch, USSR Academy of Sciences

[Abstract] This work presents specific materials on Δν (OH) for certain phosphoryl compounds calculated from ΔH and the numerical values of the electron donor property of phosphoryl oxygen. It is shown that the induction effect of substituents is predominant in determining the electron donor function in a number of phosphoryl compounds. A total of 51 compounds of the general form XYZP(O) is studied. References 9: 7 Russian, 2 Western.
[248-6508]

UDC: 547.557+547.241+541.127

KINETICS OF IMINATION OF TRIPHENYLPHOSPHINE BY 4-AZIDOTETRACHLOROPYRIDINE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 24 Jul 82) pp 568-571

KASUKHIN, L. F., PONOMARCHUK, M. P., SOLOGUB, L. S., KISILENKO, A. A. and KUKHAR', V. P., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] A study was made of the reaction of triphenylphosphine with 4-azidotetrachloropyridine, previously described as an imide synthesis method. When the solutions of the reagents are poured into tetrahydrofuran the homogeneous mixture becomes yellow, after which the color gradually decreases in intensity. The rate of decomposition of phosphazide is not sensitive to the nature of the solvent, but the reaction slows somewhat with increasing solvent polarity. Intermediate phosphazine is produced, thermal decomposition of which limits the rate of formation of the end product 4-triphenylphosphazotetrachloropyridine. References 11: 3 Russian, 8 Western.
[248-6508]

UDC: 547.26'118

INTERACTION OF MONOSUBSTITUTED DIETHYLPHOSPHOROUS ACID AMIDES WITH SULFUR CHLORIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 8 Jun 82) pp 656-660

TUPCHIYENKO, S. K., DUDCHENKO, T. N. and GOLOLOBOV, Yu. G., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] In a continuing study of phosphorotropic isomerization reactions, the authors reacted diethoxythiophosphorylsulfinylchloride and sulfur dichloride with N-monosubstituted diethylphosphorous acid amides. The reaction in a medium of ether in the presence of Et_3N occurs quite energetically liberating triethylamine sulfate. The products are symmetrical amides. Spectral data obtained in this work and data from previous works indicate similarity in the properties of phosphorus-containing and carbon-containing carrier systems with 1 to 3 migrations of the phosphorus containing groups from oxygen or sulfur to nitrogen. Reaction mechanisms are suggested. References: 5 Russian.
[248-6508]

UDC: 547.78

SYNTHESIS OF 4-PHOSPHORYLATED OXAZOLES AND THIAZOLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 20 May 82) pp 660-664

BROVARETS, V. S., LOBANOV, O. P. and DRACH, B. S., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] It is established that when betaines are heated with hydrogen peroxide in acetic acid complete elimination of sulfur occurs. After addition of sodium perchlorate to the mixture, triphenyl [2-alkyl (aryl)-4-oxazolyl]-phosphonium perchlorates (V) are liberated with good yield. The same method can be used to obtain analogous 4-phosphorylated derivatives of 2-arylthiazoles from betaines. References 7: 3 Russian, 4 Western.
[248-6508]

UDC: 547.558.1

REAMIDATION OF PHOSPHOROUS ACID HEXAALKYLTRIAMIDES BY PRIMARY AROMATIC AMINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 30 Jun 82) pp 664-670

TRISHIN, Yu. G., CHISTOKLETOV, V. N. and PETROV, A. A., Leningrad Technological Institute of the Cellulose and Paper Industry

[Abstract] A detailed study is reported of the interaction of phosphorous acid hexaalkyltriamides with primary aromatic amines. The influence of arylamine basicity on the direction of the reaction and structure of the compound formed was particularly studied. It was found that the interaction of hexaethyl and hexamethyl triamides with p-anisidine, p-toluidine, aniline, p-bromaniline and o-chloroaniline with constant removal of the corresponding dialkylamine results in substitution of all amido groups of the initial triamide. Phosphorous acid trianilides are formed independently of the basicity of the arylamine introduced to the reaction, which occurs at 60 to 65°C in 8 to 24 hours until at least 90% of the dialkylamine is liberated. The phosphorous acid trianilides decompose at elevated temperatures to form 1,3-diaryl-2,4-diarylamidodiazadiphosphetadines. References 12: 7 Russian, 5 Western.
[248-6508]

UDC: 547.241

TRIAMIDOPHOSPHAZOCHLORIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 8 Jun 82) pp 670-677

MARCHENKO, A. P., KOYDAN, G. N. and PINCHUK, A. M., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Triamidophosphazochlorides were synthesized and studied, formed with good yield with chlorination of triamidophosphazohydrides with an aqueous solution of sodium hypochlorite, chlorine in a carbon tetrachloride solution or by chlorination with chlorine in benzene. Triamidophosphazochlorides differ from triphenylphosphazochlorides in their lower thermal stability. The compounds are described. The reaction of phosphazochloride $C_{27}H_{42}ClN_7P_2$ with carboxylic acid chlorides in organic solvents occurs quite rapidly liberating chlorine and forming phosphazocarbacyls. Phosphazochlorides react easily with trimethyliodosilane even in solution. Triamidophosphazochloride, like other N-chlorocompounds, has oxidizing properties and reacts with trivalent phosphorus derivatives to form triamidophosphazophonium chlorides. These are easily alkylated by methyliodide, and also react with carboxylic acid chlorides and trimethylchlorosilane to form triamidophosphazocarbacyls and triamidophosphazotrimethylsilanes. References 12: 7 Russian, 5 Western.
[248-6508]

UDC: 547.1.118

REACTION OF S-ETHYLDIPHENYLTHIOPHOSPHINITE WITH BENZALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 6 May 82) pp 689-690

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[Abstract] It was found that the reaction of S-ethyldiphenylthiophosphinite (I) with benzaldehyde (II) in the presence of an equimolar quantity of trimethylchlorosilane (III) leads to the formation of diphenyl-α-thioethylbenzylphosphine sulfide (IV), diphenylchlorophosphine (V) and hexamethyldisiloxane (VI). The structure of (IV)was established by ^{1}H NMR, ^{31}P NMR and IR spectroscopy as well as elemental analysis.
[248-6508]

UDC: 547.26'118

SYNTHESIS OF TRIFLUOROACYLOXYDITHIA- AND OXAZAPHOSPHOLANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 21 Jul 82) pp 690-691

KONOVALOVA, I. V., MIRONOV, V. F., OFITSEROV, Ye. N. and PUDOVIK, A. N.,
Kazan State University imeni V. I. Ul'yanov-Lenin

[Abstract] A study is made of the influence of other heteroatoms on the stability of cyclic trifluoroacylphosphites. An attempt was made to produce acylphosphites containing dithia- and oxazaphospholane rings. The structure of the compounds produced was proven spectrally, their composition by elemental analysis. A diagram of the reaction is presented. References 6: 5 Russian, 1 Western.
[248-6508]

UDC: 546.18

NUCLEOPHILIC REAMIDATION IN AMINOIMINOPHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 16 Jun 82) pp 691-692

ROMANENKO, V. D., RUBAN, A. V. and MARKOVSKIY, L. N., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] Continuing their study of the reactions of compounds of two coordination phosphorus with strong nucleophilic bases, the authors established that

the interaction of aminoiminophosphines with sterically hindered lithium amides follows the type of nucleophilic substitution at the two coordination phosphorus atom and generally leads to an equilibrium mixture of the initial aminoiminophosphine and the product of its nucleophilic reamidation. Reference: 1 Western (by Romanenko and Markovskiy).
[248-6508]

UDC: 547.74/75+547.26'118

PHOSPHORYLATION OF ALKYLPYRROLES BY CHLOROPHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 2 Jul 82) p 696

GUREVICH, P. A., KISELEV, V. V., MOSKVA, V. V., ZYKOVA, T. V. and MAKSYUTOVA, S. F., Kazan Institute of Chemical Technology imeni S. M. Kirov

[Abstract] Continuing work on the synthesis of phosphorylated pyrroles, the authors studied the interaction of 2,4-dimethylpyrrole with chlorophosphites. The reaction was performed by adding an ether solution of chlorophosphite dropwise to a solution of alkylpyrrole and excess amine in ether at -10°C with agitation in an inert atmosphere. The reaction mixture was then held for 1 hour with cooling and ten hours at room temperature. The triethylamine hydrochloride was filtered off, the ether removed in a vacuum and the end product separated by distillation. Two fractions were produced. The first contained pure products with N-P bond, the second fraction contained also two new phosphorus containing products, the structure of which was established. Yield 1-O,O-diethylphosphitoyl-2,4-dimethylpyrrole, 1-O-O-dipropylphosphitoyl-2,4-dimethylpyrrole, 1-O-O-dibutylphosphitoyl-2,4-dimethylpyrrole. References: 2 Russian.
[248-6508]

UDC 547.341

UNSATURATED ORGANOPHOSPHORUS COMPOUNDS BASED ON 1-VINYLBENZOTRIAZOLE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83 (manuscript received 15 Jun 82) pp 697-698

ROZINOV, V. G., PENSIONEROVA, G. A., DONSKIKH, V. I., KALABINA, A. V., DOMNINA, Ye. S. and SKVORTSOVA, G. G., Irkutsk State University imeni A. S. Zhdanov

[Abstract] A study of phosphorylation of N-vinyl substituted nitrogen-containing heterocycles with phosphorus pentachloride established that 1-vinylbenzotriazole reacts with phosphorus pentachloride to form benzotriazolyl-N-ethenyltrichlorophosphoniumhexachlorophosphate which, when treated with sulfur dioxide and tetrabenzylammonium iodide, yields the corresponding benzotriazolyl-N-ethenylphosphonic acid dichloride and benzotriazolyl-N-ethenyldichlorophosphine. The structure of the compounds was proven by IR, ^{31}P and ^{1}H NMR spectroscopy. References: 1 Russian.
[248-6508]

UDC: 546.18

DIAMIDOFLUOROPHOSPHAZOHYDROCARBONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 10 Aug 82) pp 698-699

MARCHENKO, A. P., KOVENYA, V. A. and PINCHUK, A. M., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, Kiev

[Abstract] It was found that when an equimolar quantity of hydrogen fluoride is passed at 0-5°C with agitation through a benzene solution of diamidochlorophosphazoalkanes or -benzenes in a teflon reactor, hydrogen chloride salts of fluorophosphazocompounds are formed. These salts are easily dehydrochlorinated by triethylamine and thus converted to free diamidofluorophosphazohydrocarbons $(R_2N)_2P(F)=NR$. They are colorless liquids which distill without decomposition under a vacuum, are soluble in most organic solvents. Their structure is confirmed by elemental analysis, molecular weights, NMR and IR spectroscopy. References 3: 1 Russian, 2 Western.
[248-6508]

UDC: 547.341.26'118

SYNTHESIS OF GLYCIDYL ESTERS OF 2(3)-DIALKYLPHOSPHONOALKANOLS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 53, No 3, Mar 83
(manuscript received 15 Jun 82) pp 705-706

BREL', A. K., RAKHIMOV, A. I. and SKLADANOVSKAYA, N. N., Volgograd State Medical Institute

[Abstract] A method is suggested for synthesis of glycidyl esters of dialkylphosphonoalkanols by homolytic attachment of dialkylphosphites to unsaturated glycidyl esters in the presence of high temperature organic peroxides. 2(3)-Dialkylphosphonoalkanol glycidyl esters are thus produced by a single stage method from easily available reagents in 1.5 to 2 hours with a yield of about 85%. The initiators used are derivatives of oxyalkylperoxides or 4-methyl-4-tert-butylperoxy-2-pentanone. The influence of the relationship of reagents and their structure as well as process temperature on the rate of attachment of dialkylphosphites is found. It is shown that the reaction occurs with good selectivity and is a convenient method for synthesizing phosphorylated glycidyl esters. References: 2 Russian.
[248-6508]

UDC 547.316+661.185.233

INTERACTION OF TRIBUTYLPHOSPHINE WITH ISOPROPENYLACETYLENE

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 23, No 3, Mar 83 (manuscript received 22 Nov 82) pp 195-196

GASPARYAN, G. Ts., OVAKIMIYAN, M. Zh. and INDZHIKYAN, M. G., Institute of Organic Chemistry, Armenian SSR Academy of Sciences, Yerevan

[Abstract] Conditions are described for the formation of a 1:1 adduct by the reaction of tributylphosphine with isopropenylacetylene for 24 h at 100°C. Subsequent treatment of the adduct with HBr resulted in the isolation of an isomeric mixture of tributyl-2-methyl-1,3-butadienylphosphonium bromide. The latter were resolved on a column of silicagel L 100/160. References: 2 Russian. [261-12172]

PESTICIDES

UDC 628:66.093:632.951

HYDROLYSIS OF DICHLOROPHOS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 5, No 2, Mar-Apr 83 (manuscript received 23 Jun 82) pp 164-165

GRECHKO, A. V., NABOLOTNAYA, O. M. and MARCHENKO, P. V., Institute of Colloid Chemistry and Chemistry of Water imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] The goal of the present study was to investigate the kinetics of dichlorophos hydrolysis [0,0-dimethyl-0-(2,2-dichlorovinyl)phosphate] in aqueous medium, at normal temperature, varying the reactivity of the medium. It was shown that the hydrolysis reaction is of the first order. The hydrolysis rate constants were similar within a pH level, but dropped significantly when the reaction medium was changed from acidic to neutral to basic. At pH 1.7 the compound was stable for a long time; at pH 12.4 it broke down completely within a few minutes. Figures 2; references 4: 3 Russian (1 by Western author), 1 Western.
[267-7813]

UDC 66.092.412.35:665.633

CATALYTIC PYROLYSIS OF DIRECT DISTILLATION OF GASOLINE OVER ACTIVATED VANADIUM CATALYST

Moscow KHIMICHESKAYA PROMYSHLENNOST' in Russian No 4, Apr 83 pp 202-204

CHERNYKH, S. P., ADEL'SON, S. V., RUDYK, Ye. M., ZHAGFAROV, F. G., MOTORINA, I.A. NIKONOV, V. I., MUKHINA, T. N., BARABANOV, N. L. and PYATILETOV, V. I.

[Abstract] Performance of an activated vanadium catalyst was evaluated in a long lasting experiment on a pilot plant serving as a model for future production plants. The activating additives, which inhibited formation of coke, were various salts and oxides such as potassium sulfate or carbonate and iron or boron oxides. Experimental results obtained on the pilot plant duplicated the laboratory experience. The catalyst, removed from the pyrolytic oven after 800 hrs of continuous run was checked out on laboratory equipment. In both the regenerated and nonregenerated states its activity was equivalent to that of the fresh catalyst. This catalyst exhibited high activity and selectivity towards ethylene; its coke deposition was quite low. Figures 2; references: 8 Russian.
[258-7813]

UDC: 678.766.02

THERMALLY STABLE POLYMERS BASED ON ALICYCLIC DIANHYDRIDES

Moscow PLASTICHESKIYE MASSY in Russian No 4, Apr 83 p 59

ZHUBANOV, B. A., BOYKO, G. I. and ALMABEKOV, O. A.

[Abstract] Recent work on the synthesis of new alicyclic tetracarboxylic acid dianhydrides by photochemical interaction of maleic anhydride and its halide derivatives with benzene and its homologs by a two stage method--or single stage high temperature polycyclization in solution--has yielded good results. The single stage method is most interesting. The molecular mass of the polymer produced is greatly influenced by the content of catalyst, viscosity increasing as catalyst content increases to a maximum, then decreasing. The method can be used to produce high molecular weight soluble polyamides. The properties of films produced from cresol polyamide solutions are tabulated. Polyamide films thus produced have good mechanical and dielectric characteristics comparable to those of other known aromatic polyamides. References: 7 Russian.
[241-6508]

UDC: 539.611.678.026.3

CAUSES OF ANOMALOUSLY LOW ADHESION OF POLYMER COATINGS TO COPPER

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 83
(manuscript received 2 Sep 81) pp 378-381

TISHKOV, N. I., Institute of Mechanics of Metal-Polymer Systems, Belorussian SSR Academy of Sciences, Gomel'

[Abstract] A study is presented of the reasons for passivation of the surface of copper during thermal adhesion interactions with thermoplastic polymers with low oxygen content (vacuum or inert gas). The studies were performed on type M1 copper foil 30 μm thick, with polycaproamide, pentaplast type A and polyethylene type 21006 powders. The foil was preliminarily mechanically clean, then coatings produced by melting of the polymer powder uniformly distributed over the clean copper substrate in a vacuum installation. Suggested possible reasons for the lower adhesion in oxygen-free media include reduction of the surface of the metal substrate to free copper, formation of boundary layers on the metal surface or possible chemical reactions between the polymer and the metal surface. Figures 4; references 16: 14 Russian, 2 Western.
[243-6508]

UDC: 541.64:532.77

EXPERIMENTAL STUDY OF MASS TRANSFER OF CERTAIN MODEL AND MEDICINAL SUBSTANCES THROUGH MICROPOROUS POLYMER MEMBRANES IN AQUEOUS SOLUTIONS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 4, Apr 83 (manuscript received 24 Nov 81) pp 714-719

FEL'DSHTEYN, M. M., PETRUKHINA, O. O., SNEGIREVA, N. S., YAVORSKAYA, Ye. S., KUZNETSOVA, N. L., VASIL'YEV, A. Ye. and PLATE, N. A., Scientific Research Institute of Biological Testing of Chemical Compounds; All-Union Scientific Research Institute of Medical Polymers

[Abstract] An experimental study is presented of the diffusion of certain model and medicinal substances through a number of foreign and domestic microporous membranes of various chemical types and structures in aqueous media in response to the suggested use of microporous polymer materials for the production of timed release medicine systems. The penetrants used had limited water solubility and were intended to be easily determined by UV spectrophotometry: p-nitrobenzaldehyde and hydralazine hydrochloride. Diffusion was studied in 1/15 M phosphate buffer pH 7.20. Electron microphotographs of the surfaces of membranes plus a section through a membrane are presented. The experimental data indicate the possibility of using microporous polymer membrane materials for the creation of macromolecular therapeutic systems with controlled release of medications. Figures 6; references 7: 4 Russian, 3 Western.
[244-6508]

UDC: 541.64:539.3:537.22

ROLE OF CHARGED PARTICLES AND RELAXATION PHENOMENA IN MECHANICAL FRACTURE OF POLYMER DIELECTRICS IN STRONG ELECTRIC FIELD

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 4, Apr 83 (manuscript received 7 Oct 81) pp 721-725

KURBANOV, M. A., ABASOV, S. A., GUSEYNOV, B. A., KULIYEV, M. M. and VELIYEV, T. M., Institute of Physics, AzSSR Academy of Sciences

[Abstract] Application of a strong electric field greatly decreases the strength of polymer dielectrics in liquid nitrogen. By studying the temperature variation of mechanical durability of polymer dielectrics in a strong electric field one can determine the significance of relaxation phenomena and of charged particles in the process of fracture of the polymers. The first task is to determine whether charged particles are created in the volume of the polymer dielectric, then to determine under which conditions these charges can be liberated from their traps and participate in processes of macromolecule disturbance. The development of charges and their stabilization in an applied field were determined by thermoluminescence. The coincidence of the maxima of thermoluminescence and the minima of mechanical durability indicate an interaction between the liberation of electrons from traps and fracture of the

material. The primary cause of a change in mechanical durability of the material in a strong electric field is dynamic disturbance of molecular bonds by accelerated electrons, plus disturbance of molecules resulting from the energy of recombination phenomena. The results produced thus indicate that relaxation processes and charges formed in the polymer by the electric field play a significant role in the process of fracture of polymer dielectrics in strong electric fields. Figures 5; references 7: 6 Russian, 1 Western.
[244-6508]

UDC: 541.64:539.3

DURABILITY AND DEFORMATION BEHAVIOR OF POLYBUTADIENE IN UNIAXIAL EXTENSION IN LIQUIDS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 4, Apr 83 (manuscript received 9 Nov 81) pp 787-791

KURBANALIYEV, M. K., VINOGRADOV, G. V., DREVAL', V. Ye. and MIRDZHANOV, M. Kh., Tajik State University imeni V. I. Lenin; Institute of Petrochemical Synthesis imeni A. V. Topchiyev, USSR Academy of Sciences

[Abstract] A study is presented of the properties of polybutadiene specimens swollen to the point of equilibrium in a liquid. The experiments were performed on amorphous linear noncross-linked 1,2-polybutadiene containing 84% 1,2-links in the chain, glass point 255 K. Liquid media included normal low molecular alcohols from ethyl to amyl plus isopropyl alcohol, water and methylethylketone. Specimens were presoaked in the liquid media for 15 days, achieving equilibrium swelling. The plasticizing effect of the medium in some cases extended throughout the volume of the specimens. The effectiveness of the action of the liquid media on the strength properties of the polymer can be evaluated based on the relative change in strength of the initial polymer in air in relationship to the strength of the equilibrium swollen polymer as a function of the degree of swelling at equilibrium. Strength ratio decreases linearly with increasing swelling. Figures 7; references 7: 6 Russian, 1 Western.
[244-6508]

UDC: 541.64:539.3

MECHANISM OF INCREASING IMPACT STRENGTH OF PLASTICS BY RAW RUBBER DISPERSIONS

Moscow VYSOKOMOLEKULYARNYYE SOYEDINENIYA in Russian Vol 25, No 4, Apr 83 (manuscript received 22 Dec 81) pp 848-855

LUKOVKIN, G. M., VOLYINSKIY, A. L. and BAKEYEV, N. F., Moscow State University imeni M. V. Lomonosov

[Abstract] An attempt is made to explain the mechanism of the strengthening effect of raw rubber dispersions on brittle polymers. The experimental objects and methods are not described. Rather, a mathematical analysis of results obtained in earlier works is presented. The influence of raw rubber modifiers on the impact strength of brittle polymers is studied by analyzing the situation which occurs upon high loading rates. The deformation of the composites does not include formation of a neck, with the polymer converted to the oriented state within specific microscopic cracks or shear bands without a loss of continuity. Inelastic plastic deformation occurs simultaneously at many points in the specimen. An increase in the number of locations of localized deformation results in a decrease in the rate of localized transition to the oriented states and thus a decrease in macroscopic stress. The introduction of raw rubber dispersions causes the formation of many localized transition sites accompanied by "stress whitening". This greatly decreases the actual rate of transition of the polymer to the oriented state and therefore decreases heat liberation. Figures 2; references 28: 13 Russian, 15 Western.

[244-6508]

UDC 541(64 + 127):536.4

USE OF COMPUTERS IN STUDIES OF POLYMER THERMAL DESTRUCTION PROCESSES BASED ON THERMOGRAVIMETRIC ANALYSIS METHOD

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83 pp 29-30

PETRENKO, S. D. and MIKHAYLOV, Yu. A.

[Abstract] Thermogravimetric analysis method is based on determination of polymer mass changes under given temperature conditions: isothermal or dynamic. Although classical methods used experiments performed under isothermal conditions, some processes can be studied only under conditions of time related temperature changes, determining kinetic parameters for the entire range of temperatures based on a single specimen. The practical difficulties of this method include the use of graphs for the determination of activation energy of destruction; this introduces large errors. The second difficulty is the large number of calculations required for the determination of the data based on mathematical formulas. To avoid these problems, a computer program was developed which led to higher accuracy and reliability of these determinations.

The method utilized data on single disintegrations and applied the least squares method of analysis. One more improvement could be made in the automation of this process by feeding the experimental data directly from the derivatograph to the computer. References 7: 6 Russian (3 by Western authors), 1 Western.
[239-7813]

UDC: 621.039.55+678.744.5

INFLUENCE OF BOMBARDMENT WITH ACCELERATED ELECTRONS ON PHYSICAL-CHEMICAL PROPERTIES OF POLYESTER COATINGS

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 49, No 4, Apr 83 (manuscript received 12 May 82) pp 414-418

GRIGORCHUK, D. I., LIPATOV, Yu. S., KRUGLITSKIY, N. N. and MAKAROV, A. S., Ukrainian Scientific Research Institute of Mechanical Working of Wood; Institute of High Molecular Weight Compound Chemistry, Ukrainian SSR Academy of Sciences; Institute of Colloid Chemistry and Water Chemistry imeni A. V. Dumanskiy, Ukrainian SSR Academy of Sciences

[Abstract] A study is presented of the variation of physical and chemical properties of polyester coatings as a function of the parameters of a beam of accelerated electrons in order to determine effective conditions for curing yielding coatings with the best combination of usage qualities. A second order two-factor simplex added rotatible plan was used to study the influence of current density and absorbed energy dose on specimen properties. The growth kinetics of internal stresses were studied on various substrates. Increasing current density was found to decrease hardness, yield of gel fraction and ultimate tensile strength. Curing of coatings by accelerated electrons at low current density, 8 $\mu A/cm^2$, is most effective, producing good hardness, high gel fraction yield, good tensile strength and low internal stresses with a minimum absorbed energy dose of 100-120 kGr. Curing of coatings with accelerated electrons must be performed at minimum current density, reducing the dose of absorbed energy, to produce coatings with good physical and mechanical properties. Figures 4; references: 11 Russian.
[254-6508]

UDC: 678.664.088.8

SYNTHESIS OF PHOSPHORUS-CONTAINING POLYURETHANE SEMICARBAZIDES AND THEIR PROPERTIES

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 49, No 4, Apr 83
(manuscript received 7 Jun 82) pp 418-423

GREKOV, A. P., GONCHAROVA, L. B., BORISOV, G. S. and TROYEV, K. D., Institute of High Molecular Weight Compound Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] Linear phosphorus-containing polyurethane semicarbazides are synthesized with reduced flammability on the basis of hydroxyl-containing compounds, diisocyanates and phosphonic acid dihydrazides containing phosphorus atoms in the side chain, and some of their properties are studied. Elastic films with tensile strength up to 600 kg/cm^2 and relative elongation up to 1000% were produced from the polymer solutions. Water absorption studies showed that phosphorus-containing polyurethane semicarbazides have relatively low water absorption. The thermal stability of the polymers was studied showing that thermal destruction begins at 230-250°C, somewhat lower than for polyurethanes not containing phosphorus. However, the mass loss rate decreases with increasing temperature. The flame resistance of the modified polyurethane semicarbazides produced depends on the phosphorus content in the polymer chain. Polyurethane semicarbazides based on oligooxytetramethyleneglycol, 4,4'-diphenylmethanediisocyanate and ethyl(2-oxyethyl)phosphonic acid dihydrazide had the greatest flame resistance. Figures 4; references 8: 7 Russian, 1 Western.
[254-6508]

UDC 541.127+527.821

NEW INITIATOR FOR ACRYLAMIDE POLYMERIZATION IN AQUEOUS SOLUTIONS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 23, No 3, Mar 83
(manuscript received 24 Feb 82) pp 139-142

AKOPYAN, R. M., BEYLERYAN, N. M. and KAYFADZHYAN, A. M., Yerevan State University

[Abstract] Macrokinetic studies were conducted on radical polymerization of acrylamide in aqueous solutions employing persulfate-tertiary aminoalcohol-aminoacetic acid initiators. With triethanolamine the energy of activation for the polymerization was 33.4 $\pm$ 2.5 kJ/mole; replacement of triethanolamine by diethylethanolamine lowered the energy of activation to 31.8 $\pm$ 2.1 kJ/mole. However, although the energy of activation with diethylethanolamine was lower, evaluation of the kinetic plots demonstrated that the efficiency of the process with triethanolamine was greater, indicating that a decrease in the number of alcohol groups in the tertiary aminoalcohol lowers the reactivity of the aminoalcohol-aminoacetic acid mixture. Figures 4; references: 6 Russian.
[261-12172]

UDC 541.127+678.744.422

EFFECTS OF CERTAIN AMINOALCOHOLS ON METHYLMETHACRYLATE PHOTOPOLYMERIZATION KINETICS

Yerevan ARMYANSKIY KHIMICHESKIY ZHURNAL in Russian Vol 23, No 3, Mar 83 (manuscript received 1 Dec 80) pp 185-186

SOGOMONYAN, B. M., POGOSYAN, Zh. A. and KISHOYAN, V. S., Yerevan State University

[Abstract] Conditions are described under which the effects of diethylethanolamine, ethyldiethanolamine, and phenyldiethanolamine on the kinetics of photopolymerization (280 nm) of methylmethacrylate were investigated by determination of the K_o and K_p constants. The kinetic data demonstrated that the alkyl- and arylaminoalcohols have virtually no effect on the growth and breakage stages. In addition, these agents failed to exert any effect even under conditions in which initiation involved thermal decomposition of azoisobutyric acid dinitrile. Figures 1; references: 3 Russian.
[261-12172]

UDC 678.4.065.001.4:63

EFFICIENCY CRITERIA FOR RESIN-FIBER COMPOSITIONS EXPOSED TO DYNAMIC LOADS

Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 2, Mar-Apr 83
(manuscript received 10 Nov 82) pp 61-62

KUZ'MIN, A. V., DZYURA, Ye. A. and BLOKH, G. A., DKhTI [Unfamiliar abbreviation; a city Chemical Engineering Institute?]

[Abstract] Due to the characteristics of their construction, tests of tire performance are usually carried out by separate evaluation of individual components. This method cannot be used in the new type of tires made of the rubber reinforced with short fibers (RVK). A novel approach was taken to evaluate such tires by analyzing the deformation of the side wall resulting from internal pressure and from a contact load on a press. Internal pressure developed only a static elongation deformation. Upon addition of the press load, this deformation increased. Deformation in the radial direction was greater than the deformation in equatorial direction. On the basis of these findings, a laboratory method was developed for testing the rubber strength. It was shown that maximum mechanical fatigue of RVK is an important criterion for estimating the efficiency of tires made from it. Figures 4; references 7: 6 Russian, 1 Western.
[239-7813]

UDC: 666.113:539.238

HYDROPHOBICITY OF BUTADIENE, BUTADIENE-STYRENE AND BUTADIENE-NITRILE RUBBER FILMS ON SILICATE GLASS

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 56, No 3, Mar 83
(manuscript received 2 Jun 81) pp 551-555

SKORIK, Yu. I. and KUCHAYEVA, S. A., Institute of Silicate Chemistry imeni I. V. Grebenshchikov, USSR Academy of Sciences

[Abstract] A study is made of the hydrophobicity of butadiene, butadiene-styrene and butadiene-nitrile rubbers applied to the surface of alkali-containing and alkali-free glass. The results indicate that the hydrophobicity of these films on the surface of alkali-free glass is significantly higher than on alkali glass. The most hydrophobic films are produced by applying butadiene-styrene and butadiene rubbers to glass which has been preheated to 540°C. The

contact wetting angle of the films produced from nitrile rubber decreases significantly when heated to 300°C, then increases after heating to 350°C. reaching a maximum value. The drop in θ for the film produced from SKN-40 rubber after heating to 300°C cannot be explained by oxidative processes alone. Results produced with toluene and ethylacetate indicate a donor-acceptor interaction of π electrons in unsaturated bonds with vacant dorbitals of silicon atoms on the surface of the glass. Figures 2; references: 12 Russian. [247-6508]

UDC 678.762.2-134.43:53

PHYSICAL MECHANICAL PROPERTIES OF SALT VULCANISATES OBTAINED FROM AQUEOUS DISPERSIONS OF CARBOXYLATED BUTADIENE-NITRILE RUBBERS

Moscow KAUCHUK I REZINA in Russian No 4, Apr 83
(manuscript received 29 Oct 81) pp 6-7

GUSAKOVA, N. S., KHUTORSKOV, V. S., LYUMINARSKIY, B. M. and TSAREV, O. P., All-Union Scientific Research Institute of Synthetic Rubber imeni S. V. Lebedev

[Abstract] Butadiene-nitrile carboxylate vulcanized rubbers show excellent physical and mechanical properties, high resistance to oils and fuels and to thermal aging processes. However, their use in production of hermetic materials is limited due to their tendency towards premature structuralization upon addition of metal oxides. This problem was solved by mixing the components in the form of their aqueous dispersions. Carboxylate butadiene and butadiene-nitrile polymer films synthesized by the emulsion method were formed by adding oxide dispersions directly into the latex followed by a setting period at room temperature or somewhat elevated temperature. The physical and mechanical properties of the final products could be modified extensively by altering the amount of the oxide used. References: 2 Russian (both by Western authors). [257-7813]

UDC 678.736.2:678.043

VULCANIZATION OF CHLOROPRENE RUBBER WITH POLYETHYLENIMINE

Moscow KAUCHUK I REZINA in Russian No 4, Apr 83 pp 7-8

BOGUSLAVSKIY, A. P., AYZENBERG, M. A. and SHCHERBINA, I. V., Kiev Branch of Scientific Research Institute of Rubber

[Abstract] Polyethylenimine (PEI) may be used in various resins as a modifying, accelerating, stabilizing or activating agent. In the present study, it was evaluated as a possible vulcanizing agent for chloroprene rubbers. Its activity was determined by a thermomechanic method based on the initial temperature of the formation of crosslinking. It was shown that the vulcanized rubbers prepared with PEI had properties comparable to materials synthesized with

metal oxides. The PEI based product showed a greater tendency towards sub-vulcanization. The optimal dose of PEI was one part per 100 parts of the elastomer. A conclusion was reached that PEI could replace entirely the use of metal oxides as vulcanizing agents. Figures 2.
[257-7813]

UDC: 628.33

REMOVAL OF PHENOL FROM WASTE WATER ON IONITES

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 56, No 3, Mar 83
(manuscript received 9 Apr 81) pp 547-551

ZVEREV, V. M., SMETANINA, Ye. K. and ZVEREVA, N. N.

[Abstract] Two ionites were selected for adsorption of phenol: KU-2 cationite and AV-17 anionite. Both ionites were produced on the basis of a copolymer of styrene with divinylbenzene, yielding identical polymer framework; they were also similar in content of ionogenic groups per unit mass of resin. The main difference is thus the chemical composition of ionogenic groups. The results of the experiment indicate that anionite treated with alkali (in OH form) adsorbs phenol both by ion exchange and by physical adsorption. The cationite treated with alkali (Na form) and anionite treated with acid (Cl form) adsorb phenol primarily by physical adsorption. About 70% of the sorption capacity of the OH form anionite is a result of ion exhchange. Figure 1; references 6: 5 Russian, 1 Western.
[247-6508]

UDC 543.257.1:543.3

POTENTIOMETRIC QUALITY CONTROL OF WATER DISINFECTION IN SHIP WATER SUPPLY SYSTEMS

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 5, No 2, Mar-Apr 83
(manuscript received 18 May 82) pp 176-177

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[Abstract] In order to increase the effectiveness of quality control of drinking water disinfected by ozonization, a potentiometric method was developed based on determination of redox potential. Highly effective disinfection of water was achieved with a redox potential of 600 $\pm$15 mV,when the Coli index was 3. In general it was shown that the potentiometric titration was an effective method of determining the adequacy of disinfection of ship's drinking water. Figures 2; references 4: 3 Russian, 1 Western.
[267-7813]

UDC 628.16

QUALITY CONTROL OF DRINKING WATER BY AUTOMATIC STATION 'NAYADA'

Kiev KHIMIYA I TEKHNOLOGIYA VODY in Russian Vol 5, No 2, Mar-Apr 83
(manuscript received 8 Feb 82) pp 178-181

AR'YEV, I. A., MARCHUK, A. S., BOGOLYUBOV, N. V., GORONOVSKIY, I. T., ZHUMANOV, O., NAGIRNYY, S. N., ROMANENKO, V. D. and YEVTUSHENKO, N. Yu., Institute of Colloid Chemistry and Chemistry of Water imeni A. V. Dumanskiy, UkSSR Academy of Sciences, Kiev

[Abstract] The performance of a "Nayada" automatic analyzer of water quality, placed in a discharge canal and in a fish tank, was studied. Six physical and chemical parameters were determined simultaneously: temperature, specific conductivity, pH, redox potential, content of organic material and level of dissolved oxygen. It was shown that systematic determination of even limited indices makes it possible to reach conclusions on the variations in water composition from season to season as well as in individual instances. A sharp increase in the level of organic compounds may indicate contamination with petrochemicals; increased electroconductivity could represent dumping of some salts; a lower pH--acid impurities. It was concluded that it would be sensible to monitor fish tanks with such automated analyzers. Figures 3.
[267-7813]

MISCELLANEOUS

UDC: 541.182:577.1

INFLUENCE OF POLYELECTROLYTES ON ELECTRIC SURFACE PROPERTIES OF MICROORGANISMS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 45, No 2, Mar-Apr 83
(manuscript received 17 Dec 81) pp 273-280

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[Abstract] A study is presented of the influence of polyelectrolytes on the electric characteristics of rod-shaped bacteria, a comparative analysis of their electroorientation spectrum and electrophoretic mobility plus a theoretical analysis of the variation of the orienting moment as a function of electric field frequency. The degree of electroorientation of the cells was recorded by measuring relative changes in optical density of a cell suspension under the influence of a nonuniform variable electric field as a result of cell orientation. A two-electrode cell was used with a parallel system of platinum wire electrodes separated by 2.4 mm. The voltage across the cell was 20 V. Figures 3; references 20: 11 Russian, 9 Western.
[243-6508]

UDC: 772.17

USE OF SILVERLESS MATERIALS FOR ELECTRON BEAM INFORMATION RECORDING

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian
No 2, Mar-Apr 83 (manuscript received 1 Sep 81) pp 52-55

KUPREYCHIK, N. P., ROGACH, L. P., SEMESHKO, A. V., SYRETS, O. F. and SHCHUKIN, G. L., Scientific Research Institute of Physical-Chemical Problems, Belorussian State University imeni V. I. Lenin; Mogilev Department, Institute of Physics, Belorussian SSR Academy of Sciences

[Abstract] A study is made of the interaction of 20-60 keV electrons with various recording materials, including thermally developed polyvinyl alcohol emulsions with copper (II) chloride and iron (III) chloride or their mixtures, as well as cadmium hydroxide based layers. Though less sensitive than silver halide emulsions, these materials are much easier and faster to develop and cheaper. Studies were performed on an installation for measurement of the characteristics of cathode luminescent screens and electron sensitive materials.

The modulation transfer function was used as the basic information parameter. The maximum sensitivity achieved in recording electrons with cadmium hydroxide was $4.5 \cdot 10^6$ electrons per square micrometer, 5 to 6 orders of magnitude less than that of the most electron sensitive silver halide emulsions. The thermally developed layers achieved the same level of sensitivity. Sensitivity and contrast increased with increasing development time for the cadmium hydroxide materials, while for thermally developed materials sensitivity alone increased. The most interesting fact is considered to be the decrease in modulation transfer function with increasing electron energy. Figures 4; references: 7 Russian.
[249-6508]

UDC: 666.266.3

STRUCTURED TRANSFORMS AND CONDUCTIVITY OF TITANIUM-CONTAINING GLASSES DURING HEAT TREATMENT

Minsk IZVESTIYA AKADEMII NAUK BSSR: SERIYA KHIMICHESKIKH NAUK in Russian No 2, Mar-Apr 83 (manuscript received 8 Sep 81) pp 119-121

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[Abstract] In an attempt to produce a material with optimal properties, the influence of heat treatment conditions on the structure and electric conductivity of alkaline titanium-containing glass type T4-S was studied. Study was made of specimens of the glass with and without the addition of 0.2 mol % Nb_2O_5, Sb_2O_5 or Ta_2O_5 which were formed into tablets pressed of glass powder heat treated for 30 minutes at various temperatures between 650 and 925°C. Electron microscope studies showed that the glass with Nb_2O_5 was heterogeneous. Heat treatment of the glass at 650 to 700°C practically did not change conductivity. Heat treatment at 725 to 800°C caused some decrease in resistivity due to the increasing rutile concentration, facilitating the formation of current-conducting chains. Heat treatment at 825°C or higher caused some increase in resistivity due to the increased crystalline size. Figure 1; references: 5 Russian.
[249-6508]

UDC: 541.12.034.2:547.239.2

CHEMICAL CONVERSIONS IN COMPOUNDS CONTAINING A NITRILE GROUP UPON DEFORMATION IN COMPRESSED STATE

Moscow IZVESTIYA AKADEMII NAUK SSSR: SERIYA KHIMICHESKAYA in Russian No 4, Apr 83 (manuscript received 21 Apr 82) pp 786-792

CHISTOTINA, N. P., ZHAROV, A. A., ZHULIN, V. M. and SHAKHOVSKOY, G. P., Institute of Organic Chemistry imeni N. D. Zelinskiy, USSR Academy of Sciences, Moscow

[Abstract] A report is presented on a continuing study of conversions occurring in various nitriles upon deformation under pressure. Compounds studied include palmitic, stearic and acrylic acid nitriles, cyanoacetamide, benzonitrile, p-chlorobenzonitrile, p-nitrobenzonitrile, 3-nitro-p-methylbenzonitrile, 4-cyanopyridine, malonic, succinic, fumaric, teraphthalic and isophthalic acid dinitriles, tetracyanoethylene and polyacrylonitrile. Compression to 5000 MPa with a sapphire die causes color and transparency changes in the compounds which can be observed through the sapphire die. This allows direct observation of the chemical process at the moment of deformation and its development as the die is rotated. Conversions are shown to occur at the moment of deformation, rather than being the results of aftereffects. The reactivity of nitriles changes with pressure as well as additives. Additives with high shear stress stimulate conversion, those with low shear stress decrease the activity of the nitriles under shear and high pressure. Reactivity depends largely on structure and increases when carbon-carbon double bonds or aromatic rings are present. Reactions which occur include opening of carbon-nitrogen triple bonds and formation of carbon-nitrogen double bond groups, opening of aromatic rings and reactions involving proton transfer. Figures 6; references 10: 9 Russian, 1 Western.
[252-6508]

UDC: 539.26:621.793:669.29:621.922

X-RAY STUDY OF PROCESS OF FORMATION OF TITANIUM COATINGS ON DIAMOND

Kiev UKRAINSKIY KHIMICHESKIY ZHURNAL in Russian Vol 49, No 4, Apr 83 (manuscript received 28 Jun 82) pp 351-355

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[Abstract] An x-ray study of the phase composition of titanium coatings applied to diamond powders under various conditions is performed. The phase composition of the oxidized titanium powder screened from the diamond after metallizing was also studied. Natural diamond type A 63/50 powders, titanium powder type PTM oxidized in air in a muffle furnace to a light brown color were studied. Metallizing was performed in a vacuum at 800-1200°C, holding time 2.5 to 5 hours. It is found that vacuum annealing causes reduction of oxides

including TiO_2 to TiO_3 and TiO (II). Processes of reduction of oxides by carbon accompanied by the formation of CO also occur. These processes are accompanied by transport of the titanium to the surface of the diamond, formation of Ti and TiC layers, diffusion of carbon into the coatings which activates reduction of oxides and thus helps coating thickness to grow. References: 8 Russian.
[254-6508]

UDC: 541.8:541.123.2

SOLUBILITY OF SOLID ARGON IN GASEOUS HELIUM

Moscow ZHURNAL FIZICHESKOY KHIMII in Russian Vol 57, No 4, Apr 83
(manuscript received 11 Dec 81) pp 1005-1007

KUSHNER, L. S., DOROSHENKO, A. I., IOMTEV, M. B., ABRAMOVA, R. I. and PASHKOVSKAYA, L. V., State Institute of the Nitrogen Industry and of Products of Organic Synthesis, Moscow

[Abstract] The purpose of this work was to measure the solubility of solid argon in helium at 40-68.07K, pressure 0.3-50 MPa. Equilibrium solutions of solid argon in helium were obtained by a dynamic method in a cryostat. The work used type B helium further purified by low temperature adsorption of impurities to a total concentration of not over 10^{-8} mols and type 1 argon containing not over $1.3 \cdot 10^{-4}$ mols of impurities. A table presents the solubility of solid argon in gaseous helium for pressures of 0.3 to 50 MPa at 40, 45, 50, 60 and 68.07 K. Figure 1; references 12: 5 Russian, 7 Western.
[245-6508]

UDC 546.26-126

INTERACTION OF GRAPHITE COMPOUNDS OF EMPIRICAL COMPOSITION $C_2F \cdot 0.12BrF_3$ AND $C_2F_{1.12}$ WITH ELEMENTARY FLUORINE

Moscow ZHURNAL NEORGANICHESKOY KHIMII in Russian Vol 28, No 4, Apr 83
(manuscript received 4 Mar 82) pp 907-909

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[Abstract] This article addresses the question as to whether graphite fluorides in interstitial compounds with BrF_3 and $C_4F \cdot 0.46ClF_3$ obtained upon thermal decomposition are structural analogs of the new binary graphite fluoride recently described. To answer the question the authors studied the interaction of compounds with the empirical composition $C_2F \cdot 0.12BrF_3$ and $C_2F_{1.12}$ with elementary fluorine at 873 K, reaction time 2 hours. Elemental analysis

of the white substances produced indicated their empirical formulas were CF1.08 and CF0.99. The possibility of fluorination of graphite fluoride to graphite monofluoride as well as the IR and UV spectra of the compounds indicate that these graphite fluorides are not structural analogs of the new binary graphite fluoride with composition C_2F recently described. Figures 3; references 7: 5 Russian, 2 Western.
[246-6508]

UDC: 621.383.4

ORGANIC PHOTORESISTS WITH DRY METHOD OF APPLICATION AND DEVELOPMENT (VACUUM PHOTORESISTS)

Leningrad ZHURNAL PRIKLADNOY KHIMII in Russian Vol 56, No 3, Mar 83 p 723

BALABANOV, Ye. I., VASIL'YEV, A. I., DUBININ, N. V., IVASHCHENKO, A. V., TITOV, V. V. and ABRAMENKO, Yu. T.

[Abstract] Heterocyclic compounds and compounds with unsaturated bonds were found which satisfy the combination of requirements placed on photoresists for vacuum technology. These compounds were used to produce vacuum positive and negative photoresists applied by thermal evaporation in a vacuum forming a defect-free protective film of the necessary thickness. In laser lithography these photoresists produced elements with submicron dimensions. The photoresistive layers are resistive to the effects of plasmas of various compositions and of ion beams. References 2: 1 Russian, 1 Western.
[247-6508]

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